B.R. 11819

BRITISH RAILWAYS BOARD

REGULATIONS

FOR THE GUIDANCE

OF

TRAIN EXAMINERS

AND

OILERS

C.M. & E.E.
B.R.H.Q.
14 MELBURY TERR.
LONDON

Issued March 1976
1st Revision January 1979

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REGULATIONS FOR THE GUIDANCE OF TRAIN EXAMINERS AND OILERS

NOTE: Diagrams are included in or at the end of various Sections and are identified by the index numbers of the Sub-section to which they are applicable.

A. General Instructions

1. Purpose of Examination

The prime purpose of examination is to ascertain if there are any defects on any vehicle which could jeopardise the safe running of the vehicle or of t' train. This is of first importance and in any case arising with an element of doubt, action taken must always be in the interests of safety. The safety and comfort of passengers must always be borne in mind, as must the possibility of damage to cargo.

2. Personal Safety

A2/1. Staff engaged upon the examination of, or working on or under vehicles must at all times observe the requirements of section of B.5.3 of the Rule Book and must also comply with other regulations for their protection. These regulations are contained in the 'General Appendix to Working Timetables and Books of Rules and Regulations' and also in Instruction Notices BR 11220.

A2/2. Particular care is needed when working on or near electrified lines or overhead cables and the Working Instructions as issued to each member of the staff which apply to the line so concerned must be strictly adhered to.

A2/3. Special care is also required when dealing with coaching stock supplied with high voltage electric current from either locomotive or shore supply and staff should make sure that they are conversant with the instructions regarding coupling and uncoupling the supply cables. These are contained in Section G15 'Electric Heating' of this book and also in Sectional Appendices to the Working Timetables.

3. Duties

A3/1. The instructions which follow indicate the standards which must be worked to during examination, procedures for dealing with defective vehicles, requirements for maintenance and servicing of rolling stock and some basic dimensions. More detailed instructions on the maintenance requirements for various types of rolling stock are provided in the form of Standing Orders, Engineering Instructions and Maintenance Manuals.

A3/2 The primary responsibility for the inspection of loads rests with the appropriate Commercial and Operating staff and the Guard or other person travelling in charge of a load is responsible for its safety during transit. Carriage and Wagon examiners are empowered to stop a wagon and advise the staff responsible for adjusting or transhipping the load, in appropriate cases when it is considered that the traffic conveyed in it is unsatisfactorily loaded and/or inadequately secured, or is likely to jeopardise the stability or condition of the wagon.

A3/3. When not engaged on examination of vehicles, examining staff must undertake repairs to vehicles or other duties as may be specified. Special attention must be given to reports of defects or irregularities which may be made by guards of trains and appropriate action taken in regard to these.

Form B.R. 29206 is to be used by guards for such reports in respect of

coaching stock and freight brake vans and submitted to the Supervisor on arrival at destination.

A3/4. The main duty of an Oiler is to ensure that axleboxes are adequately supplied with clean oil and that lubricating pads etc. are maintained in good condition; other duties include the oiling of screw couplings, binding and holding down screws and shackles, oiling of buffer stems (except hydraulic type) and, as necessary, lubrication of gangway faceplates and plungers. Oilers should also assist examining staff, as necessary.

B. Examination and Brake Testing

1. General

B1/1. When trains are specified for carriage and wagon examination before departure from a station, yard or siding, it is the Examiner's duty to ascertain that every vehicle is in safe running condition, and he must be at the proper place for the examination at the time required, and he must go along each side of the train.

B1/2. He must carry out the complete brake test on the train automatic vacuum or air brake when this is specified and should be present whenever possible when the guard makes the continuity brake test and deal expeditiously with any difficulties which arise and assist in avoiding delays to trains.

B1/3. Any vehicle on a train found to have a defect which cannot be corrected in the available time must be dealt with by attaching:

(a) The appropriate 'For Repairs' labels if the vehicle is safe to travel at its normal speed and there is therefore no reason to restrict its movements.

(b) Red 'Not to Go' labels if the vehicle is considered unsafe to run. When 'Not to Go' labels have been fixed to a vehicle the guard of the train must be informed that the train must not depart until the defective vehicle has been detached. If the guard is not available at the time of examination the Inspector or other person in charge of the yard or station must be informed.

B1/4. A vehicle bearing red 'Not to Go' labels must not be moved, except for the purpose of detaching from a train when the Examiner has agreed that such movement can be made safely, or under the 'Yard to Yard' procedure described in Section C2/3.

B1/5 There is no authority to move under green 'For Repair' labels any vehicle which must be restricted to a speed less than its normal maximum. Such movement will be permitted only when authorised by the Area Manager in accordance with the procedure described in section C2/6.

B1/6. Vehicles (loaded or empty) should not be stopped and detained for repair while in transit unless unsafe to go forward to destination at normal speeds.

B1/7. In all cases the Examiner must advise the Guard when the examination is completed and say if the train is fit to proceed. (In the absence of the Guard when the examination is completed, the Examiner must inform the Inspector or other person in charge of the yard or station.) Should a train depart before examination is completed the Examiner must report immediately to the Inspector or other person in charge that the examination has been incomplete and also report the circumstances to his C. & W. Supervisor.

B1/8. Where circumstances permit examination of trains on arrival the Examiner should place himself so that the train will run past him and thus have the opportunity to see and hear irregularities in running due to defects which may not be readily apparent when the train is stationary. (For example wheel or tyre defects, bent axle, skidding wheels, squealing axleboxes.)

2. Privately-owned Vehicles

B2/1. All privately-owned vehicles required to run in traffic on B.R. lines must be registered by the British Railways Board and carry TOPS registration plates.

B2/2. The owners are responsible for maintenance and lubrication of their vehicles but the work may be carried out by their repairing agents or in some cases by B.R. staff, according to agreement, in which case local instructions will be issued.

B2/3. Privately owned wagons are subject to the same regulations and periodicities for oiling and axlebox pad examination as B.R. wagons and must have a General Repair every 7 years. Privately owned wagons out of date for oiling, axlebox pad examination or General Repairs should have green 'For Repairs' labels attached.

B2/4. Examiners are responsible for the examination of Privately Owned vehicles in the same way as for Railway Owned vehicles and if a defect is found on a Privately Owned vehicle it must have the appropriate B.R. defect labels attached.

These labels must be completed in accordance with Section C but, when applicable, destination instructions will be obtained from the owners or agent. TOPS location code numbers must be used.

3. Damage to Vehicles

B3/1. Damage to wagons may be the subject of claims for liability either against B.R. by Private Wagon Owners, or by B.R. against customers or contractors and it is necessary to be able to identify damage, the place where the damage occurred and the party responsible. A special record must be made of all such details.

B3/2. "For Repairs" or "Not-to-Go" labels must be affixed as appropriate and the labels endorsed "Damaged" with the name of the party responsible, if known. The representative of the firm causing damage must be advised the details and informed that a claim may be made, and, if possible, his signature obtained to acknowledge that he has been advised the details on which such claim may be made.

B3/3. Where special forms or procedures are in existence for reporting damage to wagons these must be used. See also Section D4.

B3/4. Where there is no examination at sidings or terminals it is the responsibility of the first examination point to identify damage defects associated with the traffic flow concerned.

4. Brake Testing Procedures

Descriptions of vacuum brake and air brake equipment on vehicles are contained in Section G7 and G8. Testing and maintenance procedures for individual vehicle types are contained in the maintenance instructions applicable and these will be made available to staff requiring them.

The regulations for working the automatic vacuum brake and automatic air brake on trains and for testing trains are contained in the General Appendix and examining staff must work in accordance with these. For easy reference extracts are included in this Section.

B4/1. Automatic Vacuum Brake.

1. Amount of Vacuum required before a train is allowed to start.

(a) Passenger Trains.

(i) The locomotive must be able to maintain 20" of vacuum with the maintaining exhauster.

(ii) Not more than 21" to be registered on the locomotive gauge.

(iii) Not less than 18" must be registered on the gauge of the rearmost brake van.

When, however, vehicles are marshalled outside the rearmost brake van, the vacuum registered in that brake van must not be less than as shown below:—

Position of brake van from locomotive	Vacuum to be registered in brake van
1st to 5th vehicle	20"
6th to 10th vehicle	19"
11th and over	18"

(b) Empty Coaching Stock Trains.
Not more than 21" registered on the locomotive gauge.
Not less than 18" registered on the gauge of the rearmost brake van.
Where vehicles are conveyed behind the rear brake van the locomotive must be able to maintain 20" of vacuum with the maintaining exhauster.

(c) Mail and Newspaper Trains and Trains in Classes 3 and 4.
Not more than 21" registered on the locomotive gauge.
Not less than 18" registered on the gauge of the rearmost brake van or on vacuum test cock at rear of train.

(d) Other Trains—Fully-fitted (Class 6).
Not more than 21" registered on the locomotive gauge.
With more than 20 fitted vehicles—not less than 16"—registered on vacuum test cock at rear of train.
With 20 or less fitted vehicles—not less than 17"—registered on vacuum test cock at rear of train.

(e) Freight Trains (Classes 7 and 8)—when vacuum brake is operative on part of the train.
Not less than 19" and not more than 21" registered on the locomotive gauge.

2. Failure to create specified vacuum.

The failure of a locomotive to create and maintain the specified degree of vacuum throughout a train may be due to one or more of the following defects:—

(i) Faulty brake equipment of the locomotive,

(ii) Front flexible hose on locomotive or rear flexible hose on train, not seated correctly on dummy coupling.

(iii) Leakage in flexible hose or in hose couplings between vehicles,

(iv) Passenger communication valve or valves partly open,

(v) Leakage at brake cylinder piston rod gland packings,

(vi) Leakage at brake cylinder release valves, direct admission valves, Guard's emergency valve, joint washers or main pipe,

(vii) Blockage of main pipe by sponge cloths, waste, etc.

3. Procedure for Tracing Defective Vehicle.

Where reference is made to the amount of vacuum in the brake van, this must be taken to be that shown on the vacuum test cock, where a brake van is not provided.

(a) Procedure at places at which a Vacuum Test Cock and $^{3}/_{16}$" diam. Locomotive Leak Disc are available.

If the locomotive of a train is unable to create or maintain the specified amount of vacuum in the rearmost brake van or on the locomotive gauge as may be appropriate in accordance with Section B4/1/1, the following procedure must be carried out:—

The Driver must at once inform the station or yard staff who will immediately advise the Carriage and Wagon Examiner.

The Examiner, accompanied by the Driver's Assistant (where provided), must proceed in the following manner:—

Uncouple the locomotive flexible hose from the train and couple this hose to the test cock. Place the leak disc over the open end of the test cock and hold this in position. The Driver must then create 20"–21" of vacuum with the high capacity exhauster and must maintain this degree of vacuum with the maintaining system. This must be recorded by the vacuum gauge attached to the test cock, and if no difficulty is experienced in maintaining 20"–21" of vacuum as stipulated, the locomotive is not at fault. If 20"–21" of vacuum cannot be created and maintained on the test cock gauge, there is a defect on the locomotive, and either the defect must be remedied or the locomotive must be changed. If a fault is found in the locomotive, and a further test with the leak disc shows the fault has been remedied, and providing the minimum specified vacuum can be maintained in the rear brake, the train can be considered satisfactory. When two locomotives are coupled together, the leak disc should first be applied to the rear of the train locomotive and test made with the leading locomotive. The leak disc test should also be applied to each locomotive separately if the fault on either locomotive cannot be readily located.

If the locomotive is found to be defective, the Station Manager, Yard Master or person in charge, must at once arrange for another locomotive to be provided. If the locomotive is found to be satisfactory, he must make preliminary arrangements for the provision of an alternative set of carriages (when passenger trains are concerned) so that preparations in this direction may be taking

place concurrently with the Examiner's tests.

If the locomotive is found not to be at fault, or if any fault on the locomotive has been corrected, and the required amount of vacuum on the train cannot be created with the high capacity exhauster and subsequently maintained with the maintaining capacity of the exhauster, the test must be continued on the train. The Examiner must place the test cock between the hose pipes of the locomotive and the leading vehicle with the gauge in communication with the train. The handle of the cock must be placed in the open position, and the Driver requested to create a vacuum of 21" or as near this figure as possible. The handle must then be turned so that the cock is in the closed position, thus isolating the locomotive, and the rate at which the vacuum falls noted.

The cock must then be removed from the front of the train by the Examiner, the hose pipes recoupled to the locomotive and the cock placed between the hose pipes of the vehicles about half way down the train when the procedure outlined in the previous paragraph must be repeated, thus testing the rear portion of the train. If the rate of fall noted on the test gauge is greater than at the previous test, it is an indication that the defect is in the rear of the train. If, however, the rate of fall is less than at the previous test, it is an indication that the defect is in the front portion of the train.

The Examiner must then proceed to test the defective portion of the train by placing the test cock in the middle of the affected portion and turning the handle so that the gauge records the vacuum in the portion of the train to the rear of the gauge. This procedure must be continued until the individual vehicle at fault is located. If no serious leakage is found, the train gauge in the rear brake van, where provided, must be tested aganst the test cock gauge by attaching the latter to the rear hose pipe. If the gauge if found to be incorrect, the Examiner should attach repair labels showing the amount by which it is reading low. If a vehicle is found to be defective the Driver should be requested to endeavour to create 21" of vacuum to assist the Examiner in finding the fault on the vehicle.

It must be understood that the Examiner alone is entitled to cause instructions, either verbal or by standard hand signal, to be given to the Driver during the period of the brake test.

If the fault has been corrected, the test cock should be removed, the hose pipes re-coupled, and the Driver requested to create and maintain the requisite degree of vacuum to be shown on the gauge of the rear brake van of the train and, if this cannot be done, the test must be repeated.

When the tests have been completed and provided no member of the staff assisting in the tests is under or between the vehicles, the Examiner must advise the Station Manager, Yard Master, or

person in charge, that :—

(a) the defect has been remedied, or

(b) the defect has been located but cannot be remedied, or

(c) that no defect can be found but the brake is inoperative on a certain portion of the train.

The Station Manager, Yard Master, or person in charge, must maintain the closest contact with the Driver and the Carriage and Wagon staff whilst the train is being examined and the test carried out. When passenger trains are involved and the defect cannot be discovered and remedied without undue delay (and the Carriage and Wagon staff must be asked to express an opinion on this) alternative arrangements must be made as speedily as possible. If the position can be met by detaching a defective vehicle or vehicles, this course must be adopted, otherwise a fresh set of carriages should be put into service.

3.(b) Procedure at places at which a Vacuum Test Cock and Locomotive Leak Disc are NOT available

If the locomotive of a train fails to create or maintain the specified amount of vacuum in the rearmost brake van or on the locomotive gauge as may be appropriate in accordance with Section B4/1/1 the following procedure must be carried out :—

The Driver must inform the station or yard staff who will immediately send for an Examiner if available.

The vacuum pipes between the locomotive and the front vehicle must be disconnected, and the locomotive pipe replaced on the dummy coupling, after which the driver must endeavour to create the specified vacuum of 20"–21". If the required amount cannot be created and maintained, the locomotive is at fault. If, however the locomotive brake is found to be in order, the pipes between the locomotive and the front vehicle must be re-coupled, whereupon the Driver must again endeavour to create a vacuum and maintain it, and whilst this is being done the Guard (and Driver's Assistant where provided), together with the Examiner, when available, must walk alongside the train and listen for any inrush of air, observing the items shown in sub-clauses (ii) to (vii) inclusive in Section B4/1/2, and particularly the connecting pipes between each vehicle. While carrying out this examination the steam heating must be shut off on the locomotive. If the defect can be located readily and overcome, this must be done.

If, however, the defect should be such that it cannot be readily repaired and isolating the cylinder will not overcome the fault, the vehicle must, if the train concerned is fully fitted, be withdrawn from service. If the train is partly fitted, the vehicle should be remarshalled in the unfitted portion.

4. 'Complete' Brake Test.

The Complete brake test is to be made by Carriage & Wagon Depart-

ment Staff and where two men are employed, one man should deal with the front third of the train and operate the brake testing valve or instruct the locomotive Driver, and the rear two-thirds of the train should be covered by the other man.

At Marshalling Yards it should be applied to such trains as are designated by the Operating Department. At terminals and other sidings it should be applied to as many wagons as possible; whenever practicable, the wagons should be tested when empty.

In the case of wagons fitted with two A.V.B. Cylinders and manual changeover gear, the changeover lever must be placed in the LOADED position when a test is made and if the wagon is loaded to the 'L' category of loading, or is empty, the lever should be reset in the EMPTY position before departure of the train (See Section G7/5).

The brake pipe should be connected through a flexible hosepipe to the supply point of the static testing equipment, or, where no static installation is available, the locomotive should be connected direct to the train.

Vacuum should then be created and be maintained throughout the train and the test guage at the front end should read from 20" to to 21". Note should be taken of the amont of vacuum recorded in the brake van or on the rear fitted vehicle of the train.

The brakes must then be inspected to see they are fully released on all wagons and whilst this inspection is being made the Examiner should listen for leakages. Finally the vacuum supply valve should be closed and a check made to see if there is any appreciable leakage in the train system.

The brake must then be applied by the Examiner at the front of the train or by the Driver and a check must be made to see that all brake blocks/pads are in hard contact with the wheels; at the same time the brake piston reserve strokes should be observed to ensure they are in accordance with permissible limits.

After examination of the train with brakes applied the brake must be released by operating the supply valve. As soon as it is seen that the brake blocks of the last vehicle have released from the wheel tyres, a further examination should be made of all wagons in the train to see if all brake blocks have released. If the brake blocks on any vehicle remain applied and this is due to a defective A.V.B. cylinder then the brake cylinder must be isolated and released by operating the release valve and the vehicle must be labelled for attention using the approved label.

IN NO CIRCUMSTANCES IS IT PERMISSIBLE TO LEAVE IN ACTION A BRAKE WHICH CANNOT BE RELEASED BY THE DRIVER'S BRAKE VALVE.

When all brakes in action release satisfactorily the vacuum brake should be disconnected in the case of static installations and the flexible hosepipe removed, thereby completing the test. The Carriage

and Wagon Examiner must then notify the Driver or Operating Department representative that the 'train is in order', informing him if it has been necessary to make the brake inoperative on any wagon(s).

Evidence that the brake test has been completed must be recorded in an approved manner by the Examiner making the test under the following headings:—

Train number or description;
Date and time of test;
Name of Examiner responsible for test;
Defects found and action taken.

Minor defects should be repaired immediately, but if this cannot be done without delay to a departing train temporary repairs should be made, or the vehicle allowed to go forward without repair providing the defect is not liable to affect the safe running and classification of the train. Vehicles so dealt with must be suitably labelled for subsequent attention.

5. Brake Continuity Test.

This test must be carried out whenever a locomotive is attached to the train, or a locomotive is changed or a vehicle(s) attached or detached. The guard must see that the required vacuum (as detailed in Section B4/1/1) is registered on the vacuum gauge in the rear brake van. He should then open the brake valve in this van, listen for an inrush of air and observe the gauge needle fall. On closing the valve the inrush of air will cease and the gauge needle should again rise to the required vacuum.

If there are vehicles behind the rear brake van, the test must be made from the rearmost vehicle by easing the vacuum pipe off the dummy coupling; an inrush of air will indicate that the pipes are correctly coupled.

If no inrush of air is heard during either of these tests, the cause must be ascertained and the defect remedied.

On fully fitted freight trains where a brake van is not provided, the test should be carried out by the application of a vacuum test cock to the pipe of the rear vehicle, but when no test cock is available the continuity of the brake must be proved by easing the pipe off the dummy coupling and ensuring that there is an inrush of air. Further, a test must be made to ensure the Driver can operate the brake by the Guard observing the application of the brake on the last two vehicles.

In the case of partially fitted Trains the Guard must instruct the Driver to apply the vacuum brake. He must then satisfy himself that the brakes are applied on the rear vehicle of the fitted portion, signal to the Driver to create vacuum and observe that the brakes are correctly released. In these circumstances it will not be

necessary for the Guard to ease off the rear hose pipe from the dummy coupling of the last vehicle in the fitted portion. The Guard need not, however, carry out this test if he has a definite assurance from a member of the C.&W. Dept. staff that the brakes have been applied and released on the rear vehicle of the fitted portion by the train locomotive.

B4/2. Automatic Air Brake.

1. Operation

(a) The brake pipe pressure is normally 72.5 lb. per square inch (p.s.i.) when the brake is released. In order to ensure complete release of the brake under certain circumstances, the Driver may temporarily increase this pressure to 78.5 p.s.i.

(b) The brake pressure is reduced to apply the brakes. A FULL SERVICE brake application is obtained by reducing the brake pipe pressure to approximately 50 p.s.i. and an EMERGENCY brake application is obtained when the brake pipe pressure is reduced to zero.

The brake pipe pressure can be reduced and hence a brake application made :—

(i) By the Driver with the automatic air brake valve.

(ii) By the Guard using the brake van emergency air brake valve.

(iii) By the Passenger Communication Apparatus.

(iv) Automatically by the Driver's Safety Device.

(v) Automatically by the Automatic Warning System on the locomotive.

(vi) Automatically by accidental train division or a defect causing loss of brake pipe pressure.

(c) The brake pipe pressure is raised to release the brake.

(d) The main reservoir pipe pressure may vary between 85 and 105 p.s.i.

(e) Although the brake is designed as a two-pipe system, it can operate as a single-pipe system, i.e. using only the brake pipe throughout either all or part of the train. When operating single-pipe, the brake pipe is used to control the brake and also to charge automatically the auxiliary reservoir on each vehicle.

Single-pipe operation is permitted if :—

(i) The main reservoir pipe pressure cannot be maintained by the locomotive between 85 and 105 p.s.i.

(ii) The main reservoir pipe or couplings become defective.

(iii) All vehicles are fitted only with the single-pipe system.

(iv) A single-pipe vehicle is marshalled immediately behind the locomotive when the whole train will then operate single-pipe.

(v) A single-pipe vehicle is marshalled behind two-pipe vehicles, when all vehicles behind it will operate single-pipe.

(f) If two-pipe operation is not possible, a fully fitted or partly fitted train is permitted to run in normal service with either all vehicles of the fitted portion working single-pipe, or with the leading vehicles working two-pipe and the rear vehicles working single-pipe. In these circumstances, the brake application and release times are slightly increased.

(g) Vehicles with distributors having fixed 'Passenger' timings must not be marshalled in fitted heads of partly fitted trains.

(h) Vehicles with changeover levers must always have these in the 'Goods' position when marshalled in the fitted heads of partly fitted trains.

(i) Fully fitted trains formed with any vehicle not permitted to exceed 60 m.p.h. may be operated with either 'P' or 'G' timed distributors predominating, but may not convey more than 1 in 4 vehicles, up to a maximum of 10, with distributors set in the opposite position. The vehicles may be marshalled to suit traffic requirements. Fully fitted trains formed with all vehicles permitted to exceed 60 m.p.h. must be formed with all distributors in the 'P' position.

(j) The operation of a train with both automatic air and vacuum brakes in use is not permitted.

2. Failure to create specified brake pipe pressure of 72.5 p.s.i.
This may be due to one or more of the following defects.

(a) A defective locomotive.

(b) A defective vehicle.

(c) The front brake pipe cock on the locomotive or the rear brake pipe cock on the train not fully closed.

(d) An intermediate brake pipe cock not fully opened.

(e) Leakage between flexible hose couplings on the vehicles.

(f) A passenger communication valve open.

(g) A brake van emergency air brake valve open.

(h) Blockage of the brake pipe due to an obstruction.

3. If, before starting, a brake pipe pressure of approximately 72.5 p.s.i. cannot be created throughout the train, the Driver must place the automatic brake valve to 'Emergency', after which the rear brake pipe cock on the locomotive must be closed and the locomotive tested. If the defect is found to be on the locomotive, either the defect must be remedied or the locomotive changed.
If the locomotive is found to be in order and hence the defect is on the train, the Guard must so inform the person in charge who must arrange for the vehicles to be examined and tested.

4. Should difficulty be experienced in locating a defect on the train due to the locomotive not being able to maintain sufficient air pressure in the brake pipe to render a leak audible, the following action should be taken.

   (a) Close both the main reservoir pipe cock and brake pipe cock behind the locomotive and request the Driver to place his brake valve in the 'Running' position.

   (b) If main reservoir and brake pipe pressures are regained open the brake pipe cock behind the locomotive. If brake pipe pressure is now maintained at 72.5 p.s.i. a reservoir pipe failure is indicated.

   (c) If brake pipe pressure cannot be maintained, a brake pipe cock must be closed on the rear of a vehicle situated approximately in the middle of the train. If the brake pipe pressure can then be restored, it is an indication that the defect is on the rear half of the train. If brake pipe pressure cannot be restored, this indicates a defect on the front half of the train. By a similar process of elimination on either half of the train, the defective vehicle and hence, the defect, can be located.

5. Complete Brake Test.

   (To be made by C. & W. staff at periods specified by the C.M. & E.E. and may be carried out by using either a locomotive or test trolley.)

   (a) The brake systems must be fully charged and the brake released.

   (b) A 'Full service' brake application must be made by the automatic air brake valve.

   (c) All vehicles must be examined and a check made that all brakes are applied on every vehicle.

   (d) The brake valve must be placed in the 'Running' position and the brake pipe recharged to approximately 72.5 p.s.i.

   (e) After an interval of 2 minutes, every vehicle must be examined and checked to ensure that all brakes have released. In the event of the brake not releasing on a vehicle, the cause must be ascertained and rectified.

IN NO CIRCUMSTANCES IS IT PERMISSIBLE TO LEAVE IN ACTION A BRAKE WHICH CANNOT BE RELEASED BY THE DRIVER'S BRAKE VALVE.

6. Brake Continuity Test.

   1. To be carried out jointly by the Driver and Guard, without exception, whenever :—

      (a) Locomotive(s) or additional locomotive(s) is/are attached to the front of a train.

      (b) Locomotive(s) or additional locomotive(s) is/are attached to the rear of a fully fitted train.

(c) Vehicle(s) is/are attached at any position in the fitted portion of a train.

(d) Vehicle(s) in the fitted portion of a train is/are detached from other than the extreme rear.

(e) Any brake defect or irregularity which has affected the continuity of the brake pipe has been rectified.

2. A brake continuity test need not be carried out when:-

(a) The train locomotive has been used for a 'Complete' brake test of the whole train and is not detached before starting.

(b) Additional locomotive(s) is/are detached from the extreme front of a train.

(c) Locomotive(s) or vehicle(s) is/are detached from the extreme rear of a train.

3. Continuity Test — Procedure.

(a) The Driver must move the automatic brake valve to 'Running' in the leading driving compartment and check that approximately 72.5 p.s.i. is registered on the brake pipe pressure guage.
He must then move the automatic brake valve to 'Shut Down/Neutral' without a pause and retain initially at least 60 p.s.i. on the brake pipe pressure gauge.

(b) When the Guard gives the train particulars to the Driver the Driver should inform the Guard that he is ready to carry out the brake continuity test.

(c) The Guard must then, without delay:—

(i) If a brake van is the rear vehicle, open the brake van emergency air valve until all air is exhausted. The valve must then be closed.

(ii) If a brake van is not the rear vehicle, open the brake pipe cock on the rear vehicle until all air is exhausted. The cock must then be closed.

Note: Except in the case of Mark 3a vehicles, if a passenger carrying vehicle is marshalled at the rear of the train, with no brake compartment, the passenger communication valve may be used instead of opening the brake pipe cock and the exhaust of air must be noted as above.
In the case of Mark 3a vehicles the test must only be carried out by opening the brake pipe cock. Use of the passenger communication apparatus or the lever at the end of the coach marked 'Air Brake Test Cock' for carrying out the Brake Continuity Test is prohibited, except in the case of vehicles on which the recess behind the 'Air Brake Test Cock' handle is painted yellow. On

such vehicles the 'Air Brake Test Cock' handle must be used for the Continuity Test.

(iii) In the case of partly fitted trains, the cock must be opened on the rear of the rear vehicle in the fitted portion until all air is exhausted.

(iv) If a locomotive is the rear vehicle, the Guard must instruct the Driver of the rear locomotive to carry out the brake continuity test. This Driver must move the automatic brake valve to 'Emergency' until the brake pipe pressure falls to zero. He must then move the automatic brake valve to 'Shut Down/Neutral' and observe that the brake pipe pressure does not immediately rise. The Guard must obtain an assurance from this Driver that this has been done.

(d) The Driver must observe that the brake pipe pressure has dropped to zero in the leading driving compartment and that it does not commence to rise again.
If the brake pipe pressure does not fall, this can be due to a brake pipe cock being closed, or the main reservoir and brake pipes being crossed between vehicles.
If the brake pipe pressure does not fall to zero this can be due to a locomotive automatic brake valve in another driving compartment not being in the 'Shut Down/Neutral, position.

(e) After correction of any fault, a further brake continuity test must be carried out.

(f) The Driver must move the automatic brake valve to 'Running' and check that 72.5 p.s.i. is registered on the brake pipe gauge. The Driver must then overcharge the brake pipe where this facility is provided, in accordance with the instruction in the Drivers Manual.

(g) The Guard must not give the signal to start until he has carried out his duties in the brake continuity test.

(h) The Driver must not start the train until he has observed the fall of the brake pressure to zero and that it has remained at zero until he has moved the automatic brake valve to 'Running'.
He must observe the subsequent rise in pressure to approximately 72.5 p.s.i. on the locomotive brake pipe pressure guage.

5. Derailments and other Mishaps

B5/1. All vehicles which have been derailed or involved in a collision or other mishap must have "Not-to-Go" labels affixed and these labels must not be removed until a full examination of the vehicle has been carried out and it is established that it is in a fit condition for service or to run under "For Repair" labels at normal train speeds to a repair depot. If not safe to travel at normal speeds but movement to a

local repair point is required, special arrangements must be made through the supervisor.

B5/2. The vehicle examination should cover the following items and it must be ensured that :—

(1) main frame members are not fractured, bent or twisted.

(2) body is not distorted and no part of the vehicle is out of gauge.

(3) axleguards or bogie frames are not fractured or bent.

(4) wheel centres, rims, tyres, flanges are not damaged and are within gauge; the wheels have not moved on the axles and are correct to road gauge.

(5) axles are not bent either between the wheels or at the journals.

(6)(a) oil axleboxes are not fractured or damaged allowing oil to escape, the journals are not damaged and the bearings and lubricating pads are intact and correctly positioned.

(b) roller bearing axleboxes are not damaged and are checked by spinning the wheels; if horseshoe adaptors are involved ensure that they seat correctly on the bearing unit.

(7) springs are not fractured or displaced and are uniform in respect of camber or height and buffer heights are within regulation limits.

(8) brakegear is intact and in working order.

(9) buffers and buffer springs are in a satisfactory condition.

(10) drawbars, pins, hooks and couplings, auto couplers and pins, are not strained or damaged.

(11) on bogie vehicles, bolster assemblies, centre castings and pins, side bearer units and all associated items are not damaged or displaced. In some cases it may be necessary for the vehicle body to be raised to permit examination of the centres.

B5/3. Coaching stock vehicles must not be released into service until ancilliary equipment—heating lighting etc.—has been properly tested.

B5/4. In all cases of derailment on running lines the vehicles immediately attached to the derailed vehicles, as well as the latter, must be held under "Not to Go" labels for full examination and not released until the Carriage and Wagon Supervisor has given instructions to this effect.

B5/5. It must be emphasised that in all cases where a train has been involved in a collision or derailment, the possibility of damage to buffing and drawgear, bogie centre castings and pins must be fully investigated on all vehicles.

B5/6. When it is necessary to establish the efficiency of the automatic brake, the reserve stroke of the vacuum cylinder pistons or actual stroke of air cylinder pistons of all vehicles on which the automatic brake has been in operation must be measured and recorded. The correct coupling of brake pipes and the position of brake cock handles must be verified.

C. Labelling of defective vehicles and containers

1. Procedures

C1/1. All labels covering the movement of defective vehicles provide for the destination and its TOPS route code to be shown. These labels must not be used more than once.

C1/2. It is essential, in order to avoid delay in movement of empty cripple vehicles to a repair depot, that all "For Repair" labels are fully endorsed with the name of the destination station and the TOPS destination code number for that station. Each examiner will be instructed on the destination and TOPS code number which will apply to empty cripple vehicles arising at his station.

The appropriate TOPS Cripple Code must also be endorsed on each label (See Section D4).

C1/3. Where route codes are required for destinations other than those provided for above, these can be obtained by reference to the TOPS Location Handbook which is available in the Yard or Area Office.

C1/4. It is important that all information called for on the labels is completed in a legible manner.

C1/5. Any unauthorised person removing or obscuring labels on vehicles will render himself liable to criminal prosecution.

C1/6. The labels are described and illustrated in Section C2 and C3.

C1/7. Special labels for use on wagons in international traffic are described and illustrated in Section F2 and F3.

In the case of Coaching Stock, the labels must be placed in the label clips, where provided, otherwise they should be tacked to the top stepboard on each side nearest the right hand end of the vehicle, the corners of the labels to be turned under and tacks inserted through the double thickness.

2. Labels and their application

C2/1. 'NOT TO GO' LABEL B.R. 11222

When a vehicle is not safe to travel a 'Not to Go' label must be placed in each traffic label clip. This label must cover, but not completely, any other label in the clip, e.g. Traffic labels on loaded wagons must be left partially exposed. In the case of Coaching Stock, if no label clip is provided, the 'Not to Go' label is to be affixed to the top stepboard on each side nearest the right hand end of the vehicle, clear of any doorway. The required particulars to be inserted on the label which must be signed by the Examiner.

The responsibility for the removal of 'Not to Go' labels from vehicles rests with C. & W. staff as and when repairs have been properly carried out.

C2/2. 'NOT TO GO—DEFECT—HOT AXLEBOX' LABEL B.R. 11222/1

When a guard, at a place where there are no Examiners, detaches from a

train a vehicle with hot axle box, he must place a 'Not to Go—Defect—Hot Axlebox' label in the clip on each side of the vehicle.

The responsibility for the removal of all 'Not to Go' labels from vehicles rests with C. & W. staff as and when repairs have been properly carried out.

C2/3. 'YARD TO YARD FOR REPAIRS' LABEL B.R. 11223

When a vehicle to which 'Not to Go' Labels (BR 11222 or BR 11222/1 or BR 11226/9) are attached, is safe to be moved, either within the yard or siding where it is located, or to another adjacent yard or siding, it must, at the same time, be over labelled with 'Yard to Yard for Repair' labels placed in such a position that the 'Not to Go' labels are not fully obscured. The 'Yard to Yard for Repair' labels duly completed and signed by the Examiner will be the only authority as to the safety for movement of the vehicle, in or between the yard/s indicated.

C2/4. 'FOR REPAIRS' LABEL B.R. 11224

When an empty vehicle requires repair but is safe to travel, it shall, except when it has defective brakes, be labelled on both sides, with labels lettered 'For Repairs' and the completed labels inserted in the label clips.

When a loaded vehicle requires repairs but is safe to travel at its designed speed, it shall, except when it has a defective brake, be labelled on both sides with labels lettered 'For Repairs'. The labels, completed except for the destination station and route Code, should be placed beneath the traffic labels. The destination details will be completed on the labels at the station or siding where the vehicle is unloaded.

C2/5. 'FOR REPAIRS—DEFECTIVE BRAKE' LABELS

Empty vehicles with defective brakes but which are otherwise safe to travel, must be labelled on each side of the vehicle, with the appropriate 'For Repairs' labels, with the red and white printed tabs, inserted in the label clips, viz:

(i) B.R. 21352/1 'AUTOMATIC BRAKE DEFECTIVE: PIPE OPERATIVE'; such vehicles to be regarded as 'piped only' and may be marshalled in fitted trains or fitted portions of trains provided that the vehicle brake is isolated.

(ii) B.R. 21352/2 'AUTOMATIC BRAKE AND PIPE DEFECTIVE'; such vehicles to be regarded as unfitted.

(iii) B.R. 21352/3 'HAND BRAKE DEFECTIVE'. Brake levers or hand wheels must be so fastened that they cannot be used. Loose shunting of vehicles so labelled is prohibited.

(iv) B.R. 21352/4 'AUTOMATIC AND HAND BRAKE DEFECTIVE'. Brake levers or hand wheels must be so fastened that they cannot be used. Loose shunting of vehicles so labelled is prohibited and such vehicles are to be regarded as unfitted.

Loaded vehicles with defective brake but safe to travel shall be labelled with the appropriate labels, described above, completed except for the destination station and route Code. These labels must be placed under traffic labels and the red and white printed tabs pulled right through the label clips so as to be clearly visible below any traffic label.

The destination details will be completed on the labels at the station or

siding where the vehicle is unloaded.

In the case of Coaching Stock, the labels must be placed in label clips, where provided, otherwise they should be tacked to the top stepboard on each side nearest the right hand end of the vehicle, the corners of the labels to be turned under and tacks inserted through the double thickness.

C2/6 'FOR URGENT REPAIR — RESTRICTED MOVEMENT' LABEL B.R. 11223/1

This label must only be used at locations where circumstances do not permit repairs to be carried out which would allow the vehicle to proceed at its normal maximum speed to its destination and where the use of 'Yard to Yard' labels is not applicable. When a vehicle bearing 'Not to Go' Labels BR 11222 or BR 11222/1 has been given temporary repair which will enable it to be moved on running lines, at a maximum speed of 35 m.p.h. to the nearest location at which a permanent repair may be effected, the 'Not to Go' Labels must be replaced by 'For Urgent Repair - Restricted Movement' labels.

These labels, fully completed and clearly endorsed with the location at which the vehicle is to be detached, must be signed by or on behalf of the Area Supervisor certifying that he is satisfied that the vehicle is safe to travel at 35 m.p.h. to the location nominated. Advice must be given to the local Area Manager that the vehicle is available for movement.

On arrival at the nominated location the 'Restricted Movement' labels must be removed and replaced with 'Not to Go' Labels BR.11222.

C2/7. 'FOR CONDEMNATION—NOT-TO-GO'—LABEL B.R. 11226/9

When vehicles are under consideration for condemnation or have been condemned and are awaiting disposal instructions, they are to be detained by attaching 'For Condemnation - Not to Go' labels, with 'Yard to Yard for Repair' labels to facilitate local movement where applicable, in the label clips on both sides of the vehicle or where label clips are not provided, affixed to the top stepboard on both sides at the right hand end of the vehicle.

These labels must be removed by Carriage and Wagon staff when disposal instructions have been received for the wagon.

C2/8. 'FOR BREAKING UP'—LABEL B.R. 11226/10

When condemnation has been authorised, the wagon painted 'COND' and instructions received to dispose for scrap, label B.R. 11226/10 'FOR BREAKING UP' duly completed, including destination station, TOPS destination code number and consignees' name must be attached in the label clips on both sides of the wagon. Labels 11226/9 must be removed from the wagon and retained at the depot for checking purposes.

When condemnation has been authorised and the wagon is not to be broken up but reserved for departmental or internal use or for conversion, it must be held under RED 'NOT-TO-GO' labels B.R. 11222 until disposal instructions are received.

If it is decided that wagons held under consideration for condemnation are to be returned to service, the labels B.R. 11226/9 must be removed by Carriage and

Wagon staff and destroyed. 'FOR REPAIRS' labels or Red 'NOT-TO-GO' labels must be attached in the label clips according to the nature of any repairs necessary.

C2/9. 'FOR INTERNAL USE'—LABEL B.R. 11227

A wagon which has been classified or sold for internal use and requires to be despatched to the place at which it is to be used, must be labelled on each side with a 'FOR INTERNAL USE' label which permits the wagon to travel one empty journey only. See also Section D4.

C2/10. 'CRIPPLE WAGON CONTROL FOR DEPOT REPAIR'—LABEL B.R. 11269/12

For use only in the movement of selected empty cripple wagons to wagon repair depots. These labels are issued only with the authority of Central Cripple Control.

C2/11. 'CRIPPLE WAGON CONTROL FOR B.R.E.L. REPAIR'—LABEL B.R. 11269/11

For use only in the movement of selected empty cripple wagons to B.R.E.L. Works. These labels are issued only with the authority of Central Cripple Control.

C2/12. 'FOR WORKS'—LABEL B.R. 11228

For use in the disposal of coaching stock vehicles to specific works for repairs according to instructions. Special care to be taken to see that all details on the label are completed, and that the date is clearly marked.

Vehicles must be labelled on each side and the labels placed in the label clips or, where clips are not provided, affixed to the top stepboard on each side nearest the righthand end of the vehicle, clear of any doorway. The corners of the label to be turned under before tacking.

C2/13. 'DUE FOR MAINTENANCE — NOT TO BE RELOADED' LABEL BR 11225

Many groups of wagons in intensive use are subject to a system of special preventive maintenance at stipulated periods and are required to be sent to specified maintenance depots (See Section E). In many cases the allocation and direction of the wagons for such maintenance is by local or national control arrangements, in order that commercial and other factors may be taken into consideration. Where, however, wagons subject to planned preventive maintenance, but not so controlled, are observed to be overdue, the label 'Due for Maintenance - Not to be Reloaded' must be placed in the label clip on both sides of the wagon. If loaded, the labels should be placed under the traffic labels and the black and white tabs pulled right through the label clips so as to be clearly visible below the traffic labels. The destination details must be completed on the label BR.11225 if instructions for disposal are known. In the case of wagons for which no instructions are held regarding destination these details must be left blank pending further direction.

C2/14. 'OUT OF ORDER' LABEL B.R. 29100

This label is to be used on Coaching Stock where a defective toilet is involved.

The label should be endorsed with the name of the station or depot and stuck on the outside door panel of the toilet, adjacent to the indicator and the door secured by removing the door handle.

The vehicle should also be labelled with 'FOR REPAIRS' labels and destination station advised by telephone.

C2/15. 'THIS COMPARTMENT IS NOT TO BE USED' LABEL B.R. 21777

Where a compartment of Coaching Stock is found in any way defective so as to render it unfit for public use and where immediate repairs cannot be effected, the quarter light of the compartment should be labelled at eye level with label 21777.

The vehicle should also be labelled with 'FOR REPAIRS' labels and destination station advised by telephone.

C2/16. 'THIS DOOR NOT TO BE USED' LABEL B.R. 11548

To be used when a coaching stock vehicle has a defective external door and the vehicle has been allowed to remain in service in accordance with the instructions in Section G11.

The vehicle should also be labelled with 'FOR REPAIRS' labels and destination station advised by telephone.

3. Reproduction of Labels

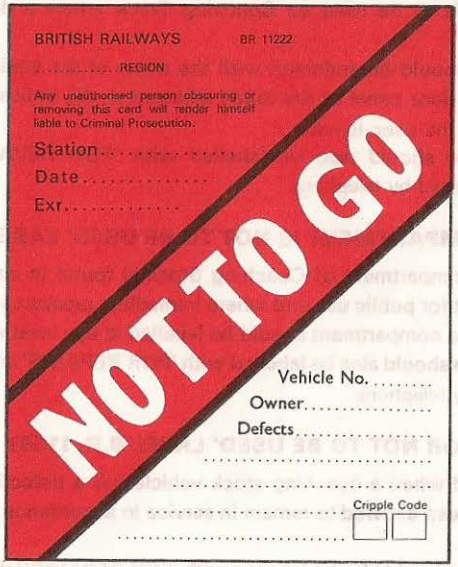


DIAGRAM C2/1
LABEL B.R. 11222

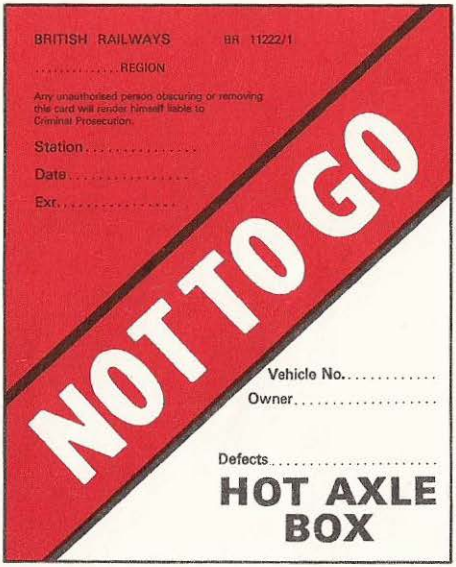


DIAGRAM C2/2
LABEL B.R. 11222/1

C3. Reproduction of Labels
Cont'd.

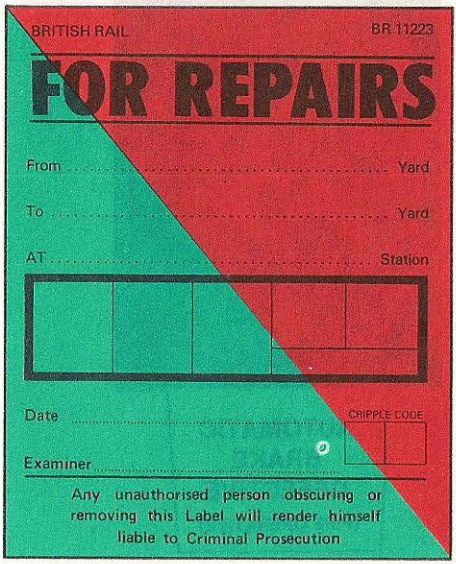


DIAGRAM C2/3
LABEL B.R. 11223

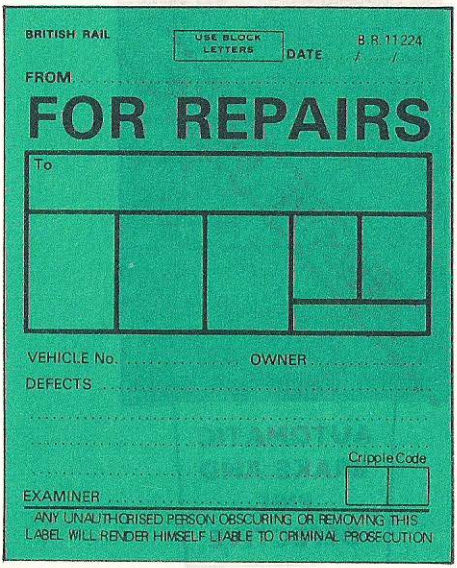


DIAGRAM C2/4
LABEL B.R. 11224

C3. Reproductions of Labels
Cont'd.

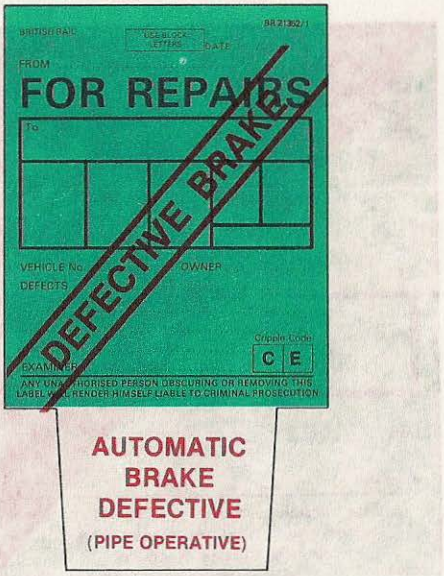


DIAGRAM C2/5(i)
LABEL B.R. 21352/1

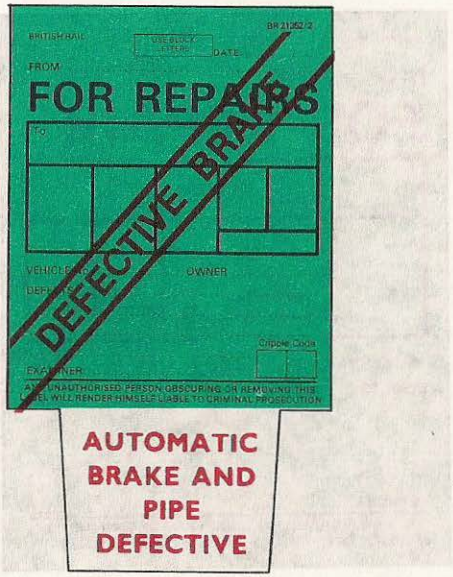


DIAGRAM C2/5(ii)
LABEL B.R. 21352/2

C3. Reproductions of Labels

Cont'd.

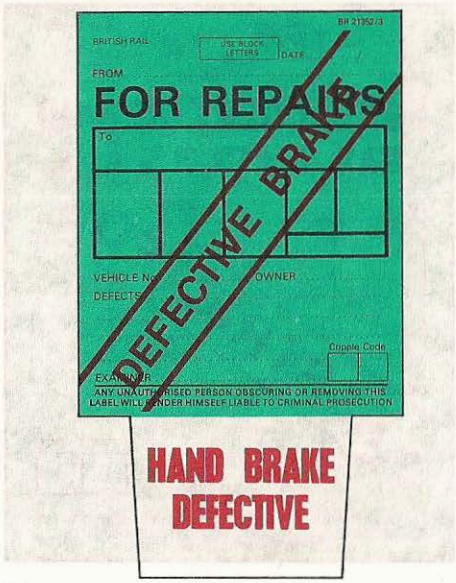


DIAGRAM C2/5(iii)
LABEL B.R. 21352/3

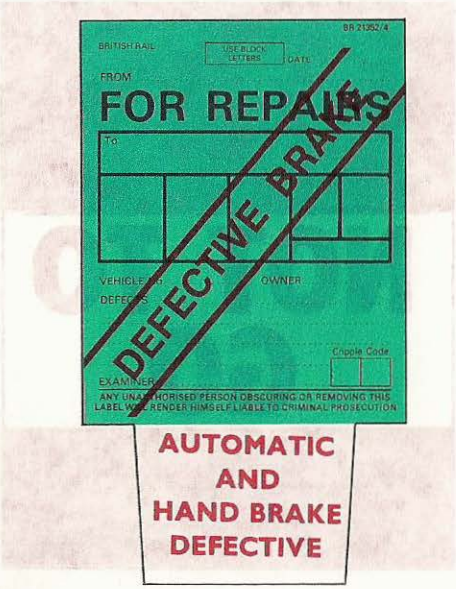


DIAGRAM C2/5(iv)
LABEL B.R. 21352/4

C3. Reproductions of Labels
Cont'd.

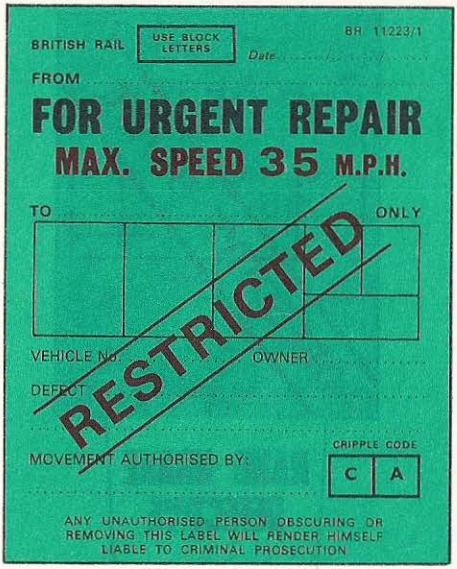


DIAGRAM C2/6
FOR URGENT REPAIR – RESTRICTED MOVEMENT LABEL B.R. 11223/1

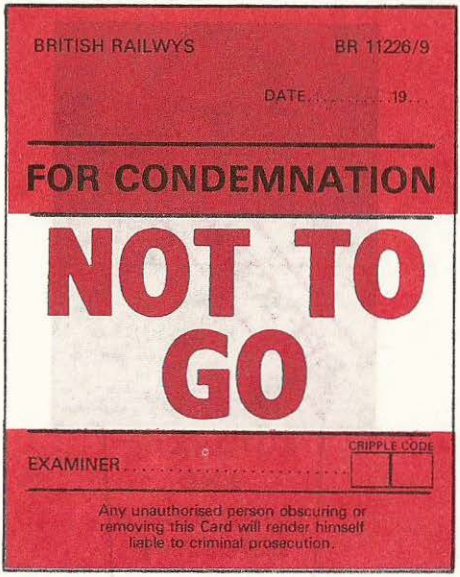


DIAGRAM C2/7
LABEL B.R. 11226/9

C3. Reproductions of Labels
Cont'd.

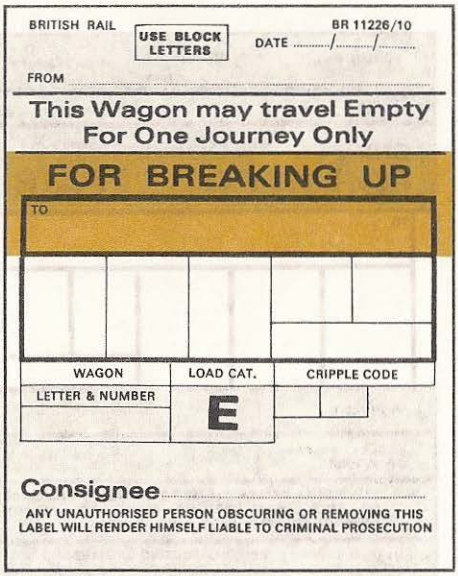


DIAGRAM C2/8
LABEL B.R. 11226/10

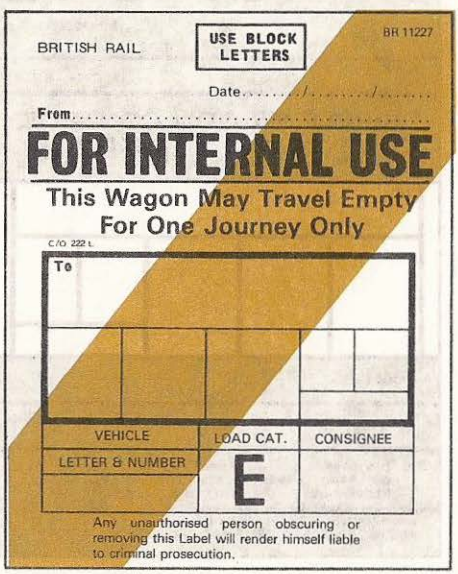


DIAGRAM C2/9
LABEL B.R. 11227

C3. Reproductions of Labels
Cont'd.

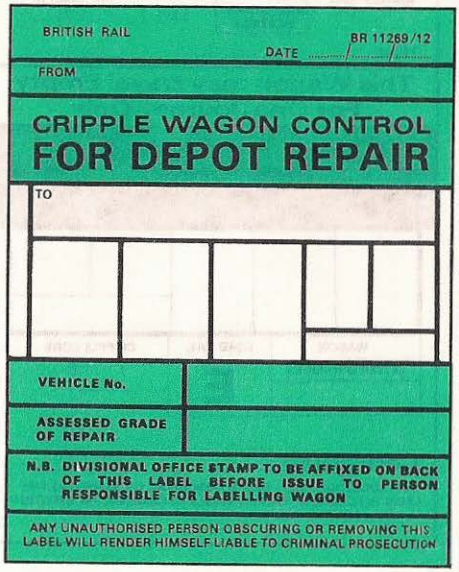

BRITISH RAIL
BR 11269/12
DATE ...../...../.....
FROM
CRIPPLE WAGON CONTROL
FOR DEPOT REPAIR
TO
VEHICLE No.
ASSESSED GRADE OF REPAIR
N.B. DIVISIONAL OFFICE STAMP TO BE AFFIXED ON BACK OF THIS LABEL BEFORE ISSUE TO PERSON RESPONSIBLE FOR LABELLING WAGON
ANY UNAUTHORISED PERSON OBSCURING OR REMOVING THIS LABEL WILL RENDER HIMSELF LIABLE TO CRIMINAL PROSECUTION

DIAGRAM C2/10
LABEL B.R. 11269/12

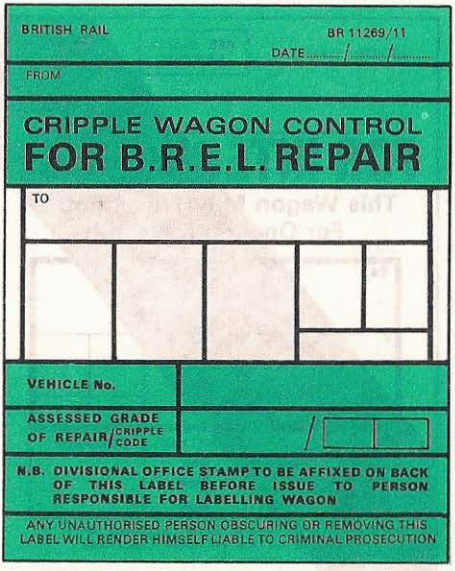

BRITISH RAIL
BR 11269/11
DATE ...../...../.....
FROM
CRIPPLE WAGON CONTROL
FOR B.R.E.L. REPAIR
TO
VEHICLE No.
ASSESSED GRADE OF REPAIR / CRIPPLE CODE
N.B. DIVISIONAL OFFICE STAMP TO BE AFFIXED ON BACK OF THIS LABEL BEFORE ISSUE TO PERSON RESPONSIBLE FOR LABELLING WAGON
ANY UNAUTHORISED PERSON OBSCURING OR REMOVING THIS LABEL WILL RENDER HIMSELF LIABLE TO CRIMINAL PROSECUTION

DIAGRAM C2/11
LABEL B.R. 11269/11

C3. Reproductions of Labels
Cont'd.

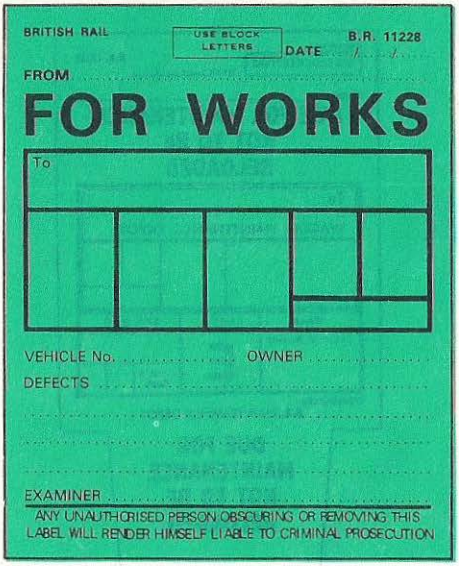

BRITISH RAIL
USE BLOCK LETTERS
B.R. 11228
DATE / /
FROM
FOR WORKS
To
VEHICLE No. OWNER
DEFECTS
EXAMINER
ANY UNAUTHORISED PERSON OBSCURING OR REMOVING THIS LABEL WILL RENDER HIMSELF LIABLE TO CRIMINAL PROSECUTION

DIAGRAM C2/12
LABEL B.R. 11228

C3. Reproductions of Labels
Cont'd.

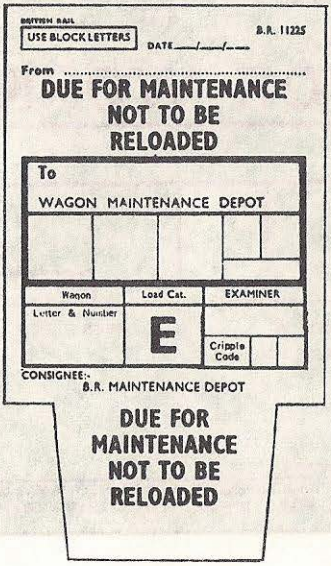


DIAGRAM C2/13
'DUE FOR MAINTENANCE — NOT TO BE RELOADED' LABEL B.R. 11225

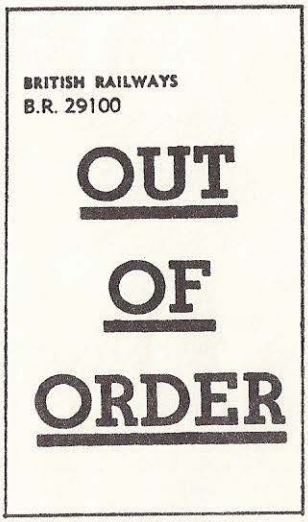


DIAGRAM C2/14
LABEL B.R. 29100

C3. Reproductions of Labels
Cont'd.

DIAGRAM C2/15
LABEL B.R. 21777

DIAGRAM C2/16
LABEL B.R. 11548

D. Reporting of defective vehicles

1. Wagons

D1/1. A report must be made on the form provided in respect of each wagon which is labelled for attention and these reports must be given each day to the Carriage and Wagon Supervisor. All wagons which are repaired by the Examiner, whether labelled or not, must be reported.

All information called for on the reporting form must be included.

D1/2. In addition to these reports to the Carriage and Wagon Supervisor, the following immediate action is required in respect of wagons stopped under 'NOT-TO-GO' labels.

D1/3. Railway owned Wagons.

When loaded, also when empty if marked for circuit working

The Examiner must report the circumstances of the stoppage to the person in charge of the station or yard, giving the following information :—

(a) Wagon number and type.

(b) Date on traffic label.

(c) The forwarding and destination stations.

(d) Names of sender and consignee.

(e) Particulars of the load, including Dangerous Goods classification, where applicable.

(f) Indication of action to be taken with the wagon, i.e. if it will be repaired and allowed to go forward under load and when it will be ready, or if the load must be transhipped or re-loaded. This action will enable the Station Manager to arrange any action necessary, including advices to customers and other stations.

D1/4. Privately owned Wagons/loaded or empty.

The Examiner must report the circumstances of the stoppage to the person in charge of the station or yard, giving the following information :—

(a) Wagon number, type and the name of the owner and/or hirer and the repairing contractor if indicated on the wagon.

(b) Date on traffic label.

(c) The forwarding and destination station.

(d) Name of sender and consignee.

(e) Particulars of the load, including Dangerous Goods Classification, where applicable.

(f) The nature of the defect, whether the wagon is repairable or requires reloading or transhipment and an indication, if possible, when the wagon will be fit to go forward.

(g) If possible details of any material required to complete the repairs.

(h) Where instructions are held for repairs to be carried out by Railway

staff indicate that the repair will be undertaken and give an estimate of the date when repairs will be completed.

D1/5. Where special books, forms or procedures are in existence for reporting these particulars these must be used.

D1/6. If privately owned wagons are not repaired promptly the Examiner must remind the person in charge daily so that everything is done to avoid delay and claims for loss of user.

2. Coaching Stock

D2/1. A report must be made on the form provided for each passenger coach or non-passenger coaching vehicle which is labelled for attention and these reports must be given each day to the Carriage and Wagon Supervisor or otherwise made available to maintenance staff, according to local instruction.

D2/2. In addition to these reports, the following action is required when repair labels are affixed to vehicles formed in trains or known to be allocated for service :—

(a) When RED 'Not to Go' labels are affixed the Station Manager or other person in charge must be informed immediately so that arrangements can be made to detach the defective vehicle and provide replacement.

(b) When GREEN 'For Repair' labels are affixed, if the vehicle, while safe to travel, has a defect which will cause inconvenience to passengers or staff or otherwise make it unsuitable for the service (e.g. lighting or heating defective) and which cannot be corrected before departure, the Station Manager or other person in charge must be informed so that a replacement can be provided if possible. If the green labelled vehicle goes forward in its train, information about the defect must be telephoned to the terminal or intermediate station where opportunity will arise to attend to the defect or replace the vehicle.

(c) If it is necessary to isolate the automatic brake on a vehicle in a train, the Guard of the train, the Inspector or Station Manager must be informed so that it can be decided whether the train is fit to remain in service in accordance with the regulations in the General Appendix regarding the permitted number, and the position in the train, of vehicles with brakes inoperative.
Note that the hand brake must be operative in the Guard's brake vehicle.

3. Report forms and their application

D3/1. C. & W. Examiners Report (B.R. Carriages, Wagons and Containers)— B.R. 11574/1.

This form should be used to report the following incidents :—

(a) B.R. Owned Vehicles stopped in the loaded condition for wear and tear defects or damage.
The form to be endorsed with the Consignee's name (except Mineral Traffic).

(b) B.R. Owned Vehicles stopped with wear and tear defects and repaired by examining staff.
If materials are required to effect repair details of these should be endorsed on Form. Details of defective components retained or sent for inspection should also be included, in the space provided on the form.

(c) All B.R. Owned Vehicles stopped for wear and tear defects which render the Wagon unsafe especially instances of the above which should have been noticed at previous Examination or Starting Point.

(d) All defects on B.R. Owned Vehicles (other than Hot Boxes and Brake Irregularities which cause delay to Classes 4 and 6 Trains).

(e) B.R. Vehicles overloaded or with displaced loads.

(f) B.R. Vehicles with defects that cause injury to individuals or animals.

(g) Empty B.R. Owned Vehicles damaged.

(h) B.R. Wagons damaged in Private Works Sidings.

(j) B.R. Wagons loaded with containers or tanks stopped because of wear and tear defect or damage.
If the container or tank is privately owned the form should be endorsed to confirm that the Owners have been advised of the stoppage.

D3/2. C. & W. Examiners Report—B.R. 11574/2.

(Privately Owned Wagons and Containers, and Vehicles registered for running in International Traffic.)
This form should be used to report the following incidents :—

(a) Privately Owned Wagons and/or Containers stopped due to wear and tear defects or damage.
The report form to be endorsed to confirm that the Owners have been advised of the stoppage.

(b) Privately Owned Wagons and Containers Repair Labelled Forward (Wear and tear defects or damage).

(c) Vehicles Registered for running in International Traffic if either stopped or repair labelled forward due to wear and tear defects or damage.

D3/3. Mishaps involving two or more Vehicles.

In those cases where more than one vehicle (railway or privately owned) is involved in any one mishap, separate report forms should be made out in respect of each vehicle damaged, care being taken to pin the report forms together. In such cases it is only necessary to state circumstances of the mishap on one of the forms.

D3/4. Release Sheet—B.R. 11574/3.

(Wagons registered under R.I.V., Privately owned wagons and containers repaired by Private Repairing Firms or by Railway Staff.)

This form should be submitted when the wagon or container is released after repair.

D3/5. Report on Hot Axleboxes — B.R. 11574/4.

This form is to be used to report all cases of Hot Axleboxes which occur on either Privately Owned or Railway Owned Vehicles.

D3/6. Report of Brake Irregularities—B.R. 11574/5.

Brake Irregularities are to be reported on this Form irrespective of the ownership of the vehicle.

4. Reporting of Crippled and Repaired Wagons and Non-Passenger Carrying Coaching Stock to TOPS

D4/1. The existing instructions for examination, labelling and forwarding crippled and repaired revenue earning, departmental and privately owned wagons and non-passenger carrying coaching vehicles remain unchanged under TOPS.

D4/2. The following instructions relate to the methods to be used to report and release such vehicles to TOPS and may be supplemented by local instructions where necessary.

D4/3. C. & W. staff who for any reason:

1. Label a vehicle as defective.
2. Label a vehicle as requiring preventive maintenance.
3. Change the cripple code of a vehicle.
4. Label a vehicle for movement for repair.
5. Release a vehicle from cripple condition.

are responsible for reporting details to TOPS.

D4/4. Complete lists of cripple reporting codes are contained in Section D4/7-D4/9. All 'For Repair' and 'Not to Go' labels must be endorsed with the appropriate cripple code.

D4/5. The following information is required for each report and additional information is required in respect of specific types of report as shown under the appropriate heading.

1. **All Reports**

   (a) The location at which the vehicle is standing.

   (b) The vehicle number.

   (i) B.R. wagons - full initials and number.
   (ii) Continental & B.R. registered RIV wagons, including privately owned - the last 10 digits of the international number.
   (iii) British privately owned wagons with yellow TOPS register plates - full details from this plate.
   (iv) B.R. non-passenger carrying coaching stock - full initials & number.

   (c) The TOPS cripple code appropriate to the cripple condition of the vehicle.

2. Vehicles standing at Yards, Stations or Terminals.

   (a) Advise the appropriate TOPS office or designated representative as soon as possible after the event:-

   (i) The information detailed in Section D4/5/1

3. Vehicles standing in a made up train in a yard or other location.

   (a) Advise the appropriate TOPS office or designated representative, before the train departs:-

      (i) The information detailed in Section D4/5/1
      (ii) The train identity - if known

4. Vehicles en route in a train.

   (a) Label or overlabel as necessary.

   (b) Endorse the labels with the appropriate TOPS cripple code

   (c) Advise the Guard of the action taken.

   (d) Advise the appropriate TOPS office or designated representative:-

      (1) The information detailed in Section D4/5/1
      (ii) The train identity.
      (iii) Details of labelling or overlabelling.

5. Repaired Vehicles released from Cripple Condition.

   (a) Advise the appropriate TOPS office or designated representative as soon as possible:-

      (i) The information detailed in Section D4/5/1
      (ii) The TOPS Release Code.
      (iii) The TOPS Destination Code for the vehicle, If known

6. Where a vehicle in a train is found to be defective but is repaired in situ and allowed to go forward without a cripple label being necessary, the event must *not* be reported through TOPS. C & W. staff must, however, maintain their own records of such repairs.

7. Grading of Wagons at a Catchment Area Focal Point.

   (a) Advise the appropriate TOPS office daily, at times and by means to be agreed locally, details of all wagons graded, quoting the appropriate TOPS code.

   (b) On receipt of disposal instructions for graded wagons:-

      (i) Attach labels as necessary, endorsed with the appropriate TOPS code.
      (ii) Advise the appropriate TOPS office as in 7(a) above, plus TOPS destination location number.

8. Disposal of Crippled Non-Passenger Carrying Coaching Stock.

   On receipt of disposal instructions for Depot or Main Works Repair.

   (a) Attach labels as necessary, endorsed with the appropriate TOPS code.

   (b) Advise the TOPS office, as in 7(a) above, plus TOPS destination location number.

D4/6 TOPS Cripple Codes : B.R. and R.I.V. Wagons.

1 Cripple Code	Description	Label No.	BR 11819 Reference
A	Restricted Movement Cripple wagon authorised for restricted movement to specified repair point at maximum speed of 35 m.p.h.	BR 11223/1 Model L (Blue)	C2/6 F2/3
B	For B.R.E.L. Works - Rebody. Graded wagon for rebodying at BREL Works.	BR 11269/11	C2/11
C	Condemned. Wagon agreed for condemnation and awaiting disposal. This code also to be used for 'Break-up on Site'.	BR 11226/9	C2/7
D	Damage To apply to BR owned wagons damaged by private party, for which costs are directly recoverable. Such wagons will not be subject to normal cripple distribution until claim for damage has been agreed.	BR 11222	B/3
E	Defective Brake - Pipe Operative Wagon to go forward with defective brake but with 'through' pipe in working order.	BR 21352/1 or 3 Model RI	C2/5 F2/5
G	Green Carded - For Grading (a) Empty wagon en route to, or at, Catchment Area Focal Point, for grading. (b) Loaded or Empty wagon en route in train, safe to travel forward to destination. (for wagons with defective brakes, use Cripple Code E or Q with appropriate labels)	BR 11224 Model K Model M	C2/4 F2/2 F2/4
J	Condemned - En Route Condemned Wagon on 'One Journey		

	Only', agreed for disposal either (a) for breaking up or (b) for internal use NOTE: This Cripple Code and Label BR.11227 is also to be used to cover one journey only movement of wagons not registered to run on British Railways, after requisite inspection and approval as laid down.	BR 11226/10 BR 11227	C2/8 C2/9
L	Green Carded - Local Wagon for Local Repair without Grading.	BR 11224	C2/4
M	For Submission. Wagon assessed as over monetary limit for repair and submitted for decision.	BR 11226/9	C2/7
N	Green Carded - Graded Wagon graded for repair at Outstation Repair Point	BR 11224 BR 11269/12	C2/4 C2/10
P	Maintenance Wagon en route to, or at, repair point for planned preventive maintenance. If such wagons are also crippled the appropriate cripple code and labels must be used.	BR 11225	C2/14
Q	Defective Brake - Pipe Not Operative Wagon to go forward with defective brake and 'through' pipe not in working order.	BR 21352/2 or 4 Model R2	C2/5 F2/6
R	Not to Go Red carded wagon, confined to siding where standing.	BR 11222 BR 11222/1 Model L (red)	C2/1 C2/2 F2/3
S	For Modification. Wagon specifically for modification of conversion.	BR 11269/11 BR 11269/12	C2/11 C2/10
T	For Transhipment	BR 11222 BR 11222/1	

	Wagon requiring transhipment of load prior to receiving repair.		
W	For BREL Works Repair Graded wagon for BREL Works Classified Repair (other than wagon for rebodying - see Cripple Code B)	BR 11269/11	C2/11
Y	Yard to Yard Red Carded wagon authorised as safe for shunt movement in, or between adjacent, yards or sidings.	BR 11223	C2/3
Z	Awaiting Materials Wagon for repair but unable to complete due to awaiting receipt of necessary materials	BR 11222 BR 11222/1	C2/1 C2/2

D4/7 TOPS Cripple Codes: Privately Owned Wagons

1. Cripple Code	Description	Label No.	BR 11819 Reference
A	Restricted Movement Cripple wagon authorised for restricted movement to specified repair point at maximum speed of 35 m.p.h.	BR 11223/1	C2/6
E	Defective Brake - Pipe Operative Wagon to go forward with defective brake but with 'through' pipe in working order.	BR 21352/1 BR 21352/3	C2/5
G	Green Carded - En Route Loaded or Empty wagon, en route in train, safe to travel forward to destination (for wagons with defective brakes, use Cripple Code E or Q with apropriate labels)	BR 11224	C2/4
J	Condemned - En Route Condemned wagon on 'One Journey Only', agreed for disposal either (a) for breaking up or (b) for internal use. Note: This Cripple Code and Label BR 11227 is also to be used to cover one journey only movement of wagons not registered to run on British Rail, after requisite inspection and approval as laid down.	BR 11227	C2/9
K	Subject to Claim Wagon damaged for which BR may be liable for the cost of repair together with loss of user claim.	BR 11224	B3 C2/4
P	Mainenance. Wagon en route to, or at, repair point for planned preventive maintenance. If such	BR 11225	C2/13

	wagons are also crippled then the appropriate cripple code and labels must be used.		
Q	Defective Brake - Pipe Not Operative. Wagon to go forward with defective brake and 'through' pipe not in working order.	BR 21352/2 BR 21352/4	C2/5
R	Not to Go Red carded wagon confined to siding where standing.	BR 11222 BR 11222/1	C2/1 C2/2
S	For Modification Wagon specifically for modification or conversion	BR 11224	C2/4
T	For Transhipment. Wagon requiring transhipment of load prior to receiving repair	BR 11222 BR 11222/1	C2/1 C2/2
W	For Private or BREL Works Repair. Wagon for Private Repairer or BREL Main Works classified repair.	BR 11224	C2/11
Y	Yard to Yard Red carded wagon authorised as safe for shunt movement in, or between adjacent, yards or sidings.	BR 11223	C2/3
Z	Awaiting Materials Wagon for repair but unable to complete due to awaiting receipt of necessary materials.	BR 11222 BR 11222/1	C2/1 C2/2

D4/8 TOPS Cripple Codes : Non Passenger Carrying Coaching Stock.

1. Cripple Code	Description	Label No.	BR 11819 Reference
A	Restricted Movement Crippled vehicle authorised for restricted movement to specified repair point at maximum speed of 35 m.p.h.	BR 11223/1	C2/6
B	Condemned. Vehicle agreed for condemnation and awaiting disposal. This code also to be used for 'Break up on Site'.	BR 11226/9	C2/7
E	Defective Brake - Pipe Operative. Vehicle to go forward with defective brake but with 'through' pipe in working order.'	BR 21352/1 BR 21352/3	C2/5
G	Green Card - En-Route Loaded or Empty vehicle, en route in train, safe to travel forward to destination. (For vehicles with defective brakes use Cripple Code E or Q with appropriate labels).	BR 11224	C2/4
J	Condemned - En-Route Condemned vehicle on 'One Journey Only', agreed for disposal either		
	(a) for breaking up or	BR 11226/10	C2/8
	(b) for internal use	BR 11227	C2/9
	Note: This cripple code and Label BR 11227 is also to be used to cover one journey only movement of vehicles not registered to run on British Rail, after requisite inspection and approval.		
L	Green Carded - Local Vehicle for local repair	BR 11224	C2/4
M	For Submission Vehicle assessed as over	BR 11226/9	C2/7

	monetary limit for repair and submitted for decision.		
N	Green Carded - Depot Vehicle for repair at Outstation Depot.	BR 11224	C2/4
P	Maintenance Vehicle en route to, or at, repair point for planned preventive mainenance. If such vehicles are also crippled then the appropriate cripple code and label must be used.	BR 11225	C2/13
Q	Defective Brake - Pipe Not Operative. Vehicle to go forward with defective brake and 'through' pipe not in working order.	BR 21352/2 BR 21352/4	C2/5
R	Not to Go Red carded vehicle confined to siding where standing.	BR 11222 BR 11222/1	C2/1 C2/2
S	For Modification Vehicle specifically for modification or conversion.	BR 11224 BR 11228	C2/4 C2/12
W	For BREL Works Repair Vehicle for BREL Works coded repair	BR 11228	C2/12
Y	Yard to Yard Red carded vehicle authorised as safe for shunt movement in, or between adjacent, yards or sidings	BR 11223	C2/3
Z	Awaiting Materials Vehicle for repairs but unable to complete due to awaiting receipt of materials.	BR 11222 BR 11222/1	C2/1 C2/2

D4/9 TOPS Repair Release Codes

57 — Cripple Siding/Depot Repair (Freight)
58 — Cripple Siding/Depot Repair (N.P.C.C.S.)
59 — Traffic Siding Repair (Freight)
70 — Planned Preventive Maintenance
71 — Planned Preventive Maintenance with repair
90 — No repair

E. Wagons scheduled for Periodic Maintenance

1. Wagons in Selected Circuit Working. Wagons Designed for particular Traffics. Wagons requiring special facilities for maintenance. Some types of service Wagons

E1/1. In order to keep these groups of wagons in serviceable condition, reduce the likelihood of failure in traffic and control the number out of service for attention, they are included in a system of preventive maintenance which requires them to be worked into a suitable maintenance depot at defined periods.

E1/2. The standard system used to identify these wagons is the provision of a maintenance panel on each side, normally on the solebar. This panel is in the form of a 'Ladder' with spaces in which to paint:—

The date when maintenance will be due.

The date when maintenance attention has been given.

The code number for the depot where the maintenance has been given.

At the left of the panel against the letter M is painted the period (in months) which has been stipulated for the particular group of wagons.

The number of spaces along the ladder represents the interval between works repairs, e.g. if the maintenance period is 3 months, a twelve space ladder will be completed in 3 years which will be the planned period for works repairs.

3M	1	2	3	4	5	6	7	8	9	10	11	12
DUE	10·12 72	8·3 73	12·6 73	9·9 73								
MAINTAINED	8·12 72	12·3 73	9·6 73									
DEPOT SHOP OR WORKS NO.	3801	3772	3801									

E1/3. When groups of these wagons are working in circuit, it is usual for them to be directed to a maintenance depot under a local or national control arrangement. Where this does not apply, Examiners should label a wagon for maintenance when observed to be overdue; Label BR.11225 must be used as described in Section C2/13.

E1/4. These wagons are subject to the same examination requirements when in traffic as other freight stock and the fact that they receive regular depot attention does not relieve the examiner of any responsibility for examination.

E1/5. Local instructions will be given where any other system of identification is used for groups of wagons which come under special maintenance procedures.

E1/6. Freightliner trains are examined and maintained at designated terminals or maintenance depots. Train examiners other than at Freightliner terminals may be called upon to examine Freightliner trains and must be prepared to attend to any defect and do everything possible to keep train delays to a minimum.

F. Wagons in International Traffic.

1. Regulations and wagon markings

F1/1. Except when specially authorised in each case, wagons required to operate between Great Britain and the Continent via ferry services must conform to the requirements of the Regulations governing the reciprocal use of wagons in international traffic (R.I.V.).

The information in the following sections has been compiled in brief form from these regulations, to which reference must be made for more detailed instructions.

F1/2. The Regulations cover the construction, dimensions, maintenance, loading and use of wagons in international traffic and require that each wagon shall carry the following markings:—

1. The wagon number, comprising 12 digits, which give the following information.
   The exchange arrangements applicable to the wagon.
   The Railway owning the wagon or with whom it is registered if privately owned.
   The operating characteristics of the wagon.
   The wagon serial number and checking digit.
   Note. On railway owned wagons the first three numerical groups are also followed by the same information in letter form and in this context the letters RIV also certify that the wagon satisfies all the constructional requirements of the RIV regulations.

2. The International Standard Sign.
   This sign now replaces the panelled RIV sign and indicates that the wagon complies with the conditions covering international standardisation.

3. The Restricted movement sign.
   A wagon which does not qualify to carry the letters RIV as referred to in the note to Section F1/2/1 may however be accepted for movement to designated administrations in which case it must carry a special sign as exemplified in the diagram; the larger letters signify the owning administration and the smaller letters the administrations over whose lines the wagon may be operated.

4. The Anchor in Rectangle Sign.
   This indicates that the wagon is also approved for running on B.R. lines.

5. The Revision Date Panel.
   To indicate the date when the wagon was last overhauled and the Depot where this was carried out.

6. The Lubrication Panel.
   To indicate the date when plain bearing axleboxes were last oiled and the Depot where this was carried out.
   Note. With certain exceptions only, plain bearing axleboxes are no longer acceptable under the RIV regulations.

7. The Load Panel.
To indicate the maximum loads applicable on the lines of different railway administrations. B.R. limitations come under the 'B' heading.

8. The Maximum Speed Indication.
The signs /S/ or /SS/ signify that the wagons are capable of running at maximum speeds of 100kmh (60mph) or 120kmh (75mph) respectively. Wagons not so marked are limited to a maximum speed of 80 kmh (50mph).
In order to run at these speeds the wagon must be loaded within the limitations marked on the load panel (Diagram F/1/2/7).
Before any continental ferry wagon is formed in a BR train, the permitted speed of which is in excess of 45mph, the T.O.P.S. output for the wagon for the journey in question must be examined to confirm that the vehicle is permitted to run at the maximum speed of the train concerned.

F1/3. The maximum period between overhauls is:—
1 year for wagons marked SS which are estimated to run more than 50,000 miles per annum.
2 years for other wagons marked SS; in such cases a figure '2' must be shown at the left of the revision panel.
4 years for all other wagons unless a figure 5 is shown at the left of the revision panel to indicate that the periodicity is 5 years.
No relaxation in the prescribed periodicities may be allowed for wagons marked SS and any such wagons found to be overdue for overhaul should have Model M labels attached in accordance with Section F2/4.
For wagons other than those marked SS the overhaul date may be exceeded by up to 3 months and this may, as an optional measure by the owning administration, be indicated by the sign '+3M' appended at the right of the revision date panel.
If the overhaul date is exceeded (after having been appropriately increased by a period of 3 months in the case of wagons bearing the sign '+3M') the wagon should have Model M labels, B.R. 20905/11, attached in accordance with Section F2/4.

F1/4 Brakes.
Vehicles in international traffic work on a one-pipe air brake system and some vehicles have a brake pipe coupling hose located on both sides of the drawhook for ease of coupling. (This pipe should not be confused with the main reservoir pipe on vehicles fitted with the B.R. two-pipe system.) Only one brake pipe at each end of a vehicle should be coupled up and it should be noted that the colour code for the brake pipe on foreign administration vehicles need not conform to the B.R. colour code. Defective or missing coupling hoses must be replaced even though there may be another satisfactory coupling at the same end of the vehicle.
Vehicles in international traffic have the brake isolating cock in reverse of the normal British practice, i.e. when the handle is in line with the pipe the brakes are isolated and when the handle is at right angles to the pipe the brake is operative.
Foreign owned vehicles in international traffic are allowed to run with brake blocks worn down to 10mm (⅜") at their thinnest point. Vehicles coming under notice

with worn blocks must be changed as if owned by British Railways. For railway owned vehicles no charges to be raised for labour on B.R. material. Vehicles owned by the S.N.C.F. returning via Dunkerque or vehicles owned by the S.N.C.B. returning via Zeebrugge need not have this attention given to them. This exception does not apply to privately owned vehicles registered by the S.N.C.F. or S.N.C.B.; these must be dealt with as any other privately owned vehicle i.e. charges raised for material and labour in accordance with R.I.V. regulations.

It should be noted that although R.I.V. Regulations demand that any wagons forwarded to British Railways must be fitted with a hand lever brake, the fact of such brake being defective does not constitute grounds for refusal of entry of the wagon to this country. When found necessary, therefore, the hand brakes should be adjusted or Defective Brake Labels, B.R. 21352/3, attached and brake levers secured, in accordance with Section C2/5.

F1/5 Side Bearing Springs.

When a bearing spring is defective on a non-bogie tank vehicle both springs on the same axle must be changed.

R.I.V. Regulations demand that, on wagons fitted with double link suspension or long single link suspension, the clearance between spring buckle and spring stop must never be less than 15mm. Examining staff should therefore ensure that this requirement is satisfied, particularly in the case of B.R. Ferry wagons loaded for export.

F1/6 Wheels and Axles

The dimensions and limits of wear of wheels and tyres on R.I.V. wagons differ from B.R. Standards

Width of tyre or rim - Max. 140mm : Min. 133mm
(B.R. Ferry Wagons ; Min. 130mm until 31.12.82)

Minimum thickness of tyres
SS wagons 35mm : S wagons 30mm
Other wagons 25mm

Minimum thickness of the rim of solid wheels is indicated by a circular groove machined in the outer face of the rim. The groove must be always fully visible.

Minimum flange thickness is 22mm measured at a distance of 10mm from the surface of the tread, using the R.I.V. gauge. The flange must not be worn to a sharp edge and the flange slope must be within gauge.

Any flats on the tread must not exceed 60mm (approx. 2½") in length.

When wheels are gauged after a derailment, the back to back measurement between flanges must be taken in 3 positions. Each measurement must be between 1357 mm and 1363 mm and any variation between measurement must not exceed 4mm for plain bearing wheelsets or 2 mm for roller bearing wheelsets. Otherwise attention to the wheel set will be required before the vehicle can proceed.

Vehicles which are designed to be fitted with interchange axles for working over the Spanish Railways (R.E.N.F.E.) might be fitted with wheelsets which do not belong to the particular vehicle. The wheelsets must be overhauled every four years and the date of the last overhaul is painted on the wheel centre and axlebox front cover. Vehicles found with wheelsets overdue for overhaul should have model M labels attached in accordance with Section F2/4.

2. Wagon Labelling

F2/1. The labels which are authorised in the R.I.V. regulations for use on defective vehicles are described in F2/2—F2/6.

If a Foreign Administration vehicle comes under notice defective in this country and the Examiner has not access to the R.I.V. model labels, the appropriate B.R. repair labels may be used and the Examiner at Dover or Harwich will be responsible for attaching the correct model label and removing the B.R. labels, having extracted the necessary information. It is therefore essential that the B.R. repair labels contain all the relevant information. These labels should be affixed, if possible, on wagon sides near the label holders or otherwise on the solebar, on each side of the wagon. (not in the label holders) and the facts reported to TOPS in accordance with Section D4

British vehicles in International traffic, including British vehicles arriving from Foreign Administrations with R.I.V. model labels, should be labelled in accordance with the instructions contained in Section 'C'. It should be noted that the Foreign Administration labels may not be printed in English but the defects can be identified, as the model label letter and clause numbers on the English printed labels are identical to those on the Foreign Administration labels. When B.R. labels are attached, the station name and country as quoted on the R.I.V. labels should be endorsed on the B.R. repair labels. The R.I.V. defects labels may then be removed.

Foreign Administration vehicles arriving in this country with Model 'K' or Model 'M' labels not printed in English should have the appropriate British model labels attached with the same clause underlined.

F2/2. Model 'K' Label B.R. 20905/9.

Used when a vehicle is defective and not suitable for re-loading but is fit to travel at its design speed to its owning administration. In accordance with Section F2/1 a repair label B.R. 11224 may be used and should be endorsed in large letters 'NOT TO BE RE-LOADED' and the letter 'K'.

The model 'K' labels should also be used on defective Foreign Administration Containers if not fit for re-loading and they must be visible from the outside of the wagon on which the containers are loaded.

F2/3. Model 'L' Labels.

Used for vehicles which are severely damaged, i.e. not fit to continue the journey on their own wheels. No action should be taken with any such vehicle until instructions have been obtained from the owning administration and it should be held under 'Not-to Go' labels B.R. 11222 until loaded up or repaired and the model 'L' labels are attached.

All British wagons arriving at Dover or Harwich with model 'L' labels attached should be held under 'Not to Go' labels B.R. 11222 until they have been inspected for safe running and/or out-of-gauge conditions.

There are two model L labels – RED and BLUE.

RED Model L label B.R. 20905/20

Used when a severely damaged vehicle is loaded on to a wagon for return to its owning administration. Also used to return a damaged bogie.

BLUE Model L label B.R. 20905/10

Used to transfer a severely damaged vehicle on its own wheels,

(a) by arrangement with and to the adjacent owning administration, that

is S.N.C.F. via Dunkerque or S.N.C.B. via Zeebrugge or a B.R. vehicle returning to this country if damaged on S.N.C.F. or S.N.C.B. This does not apply to privately owned vehicles.

(b) to an owning administration, which may, or may not be, an adjacent administration, after the vehicle has been suitably repaired to enable it to run at its design speed.

F2/4. Model M label B.R. 20905/11.

For use when the vehicle is defective but is safe to be reloaded and travel at its design speed. A vehicle carrying model M labels may be reloaded to or towards but not beyond the owning administration. In accordance with Section F2/1 a repair label B.R. 11224 may be used and should be endorsed in large letters 'MAY BE RELOADED' and the letter 'M'.

F2/5. Model R1 Label B.R. 20905/13.

For use when :—

1. A vehicle has a defective hand brake ; the right hand part of the card to be detached.
2. A vehicle has a defective power brake but the through brake pipe is operative ; the left hand side of the card to be detached.
3. Both power and hand brake are defective but the through brake pipe is operative ; the complete card is then used.
4. A wheel has a suspected moved tyre but is not loose and there is no transversal displacement. The brake must be isolated and R1 labels attached (with left hand side detached) and endorsed 'Tyre displaced by rotation'. A model M label must be attached also.

N.B. A vehicle carrying R1 labels may be reloaded to or towards but not beyond the owning administration. In accordance with Section F2/1 the appropriate B.R. Brake Repair labels may be used and should be endorsed in large letters 'MAY BE RELOADED' and the letter and number 'R1'. In the case of clause 4, a letter M should also be endorsed on the card.

F2/6. Model R2 Label B.R. 20905/14.

For use when the brake pipe is defective. The vehicle must also have model K labels attached. Should the hand brake be defective R1 labels should also be attached.

In accordance with Section F2/1 B.R. Brake Repair label B.R. 21352/2 may be used and should be endorsed in large letters 'NOT TO BE RELOADED' and the letter and number R2.

5

F2/7. 'Not-to-Go' Label B.R. 11222.

Vehicles in International traffic found to be unfit to travel must be labelled with 'Not-to-Go' labels in accordance with Section C2/1.

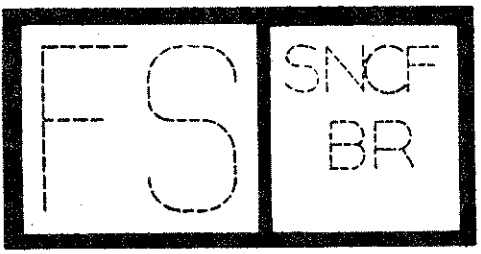
3. Reproduction of Wagon Marking and Labels

21 RIV
70 BR
214 Hfs
0000 -7

12 DIGIT WAGON NUMBER
DIAGRAM F1/2/1

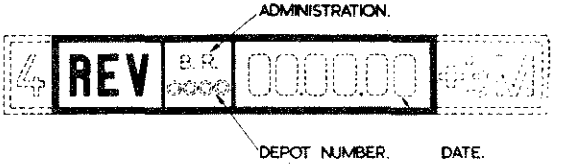
St

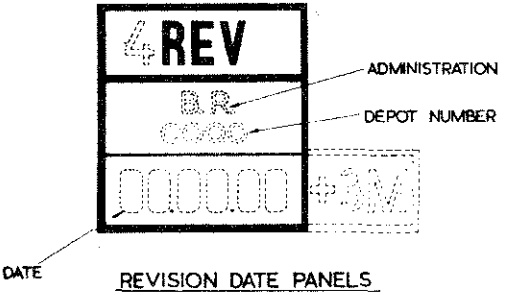
INTERNATIONAL STANDARD SIGN
DIAGRAM F1/2/2



RESTRICTED MOVEMENT SIGN
DIAGRAM F1/2/3

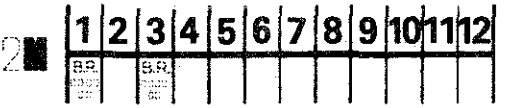
ANCHOR IN RECTANGLE SIGN
DIAGRAM F1/2/4





REVISION DATE PANELS

DIAGRAM F1/2/5



LUBRICATION PANEL

DIAGRAM F1/2/6

REVISION DATE AND LUBRICATION PANELS

		A	B	C
1)		20,5t	24,5t	28,5t
2)	S	20,5t	24,5t	
3)	SS	15,5t		

		A	B	C
1)		20,5t	24,5t	
2)	S	20,5t	24,5t	
3)	SS	15,5t		

		A	B	C
1)		20,5t		
2)	S	20,5t		
3)	SS	15,5t		

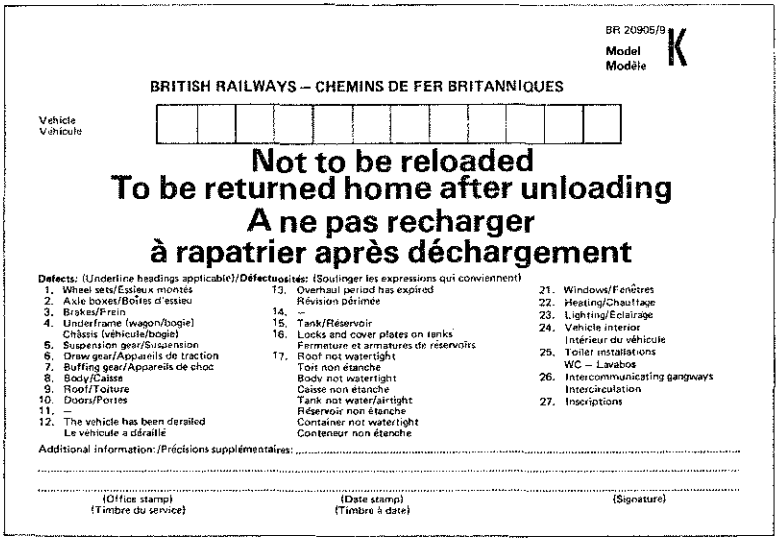
LOAD PANELS

1) MAXIMUM LOADS TO BE OBSERVED IN THE CASE OF WAGONS INCORPORATED IN TRAINS OTHER THAN FAST TRAINS (TO BE SHOWN ON ALL WAGONS.)

2) MAXIMUM LOADS TO BE OBSERVED IN THE CASE OF WAGONS INCORPORATED IN FAST TRAINS CAPABLE OF RUNNING AT A MAXIMUM SPEED OF 100 km/h 60 m.p.h. (TO BE SHOWN ONLY ON /S/ AND /SS/ WAGONS.)

3) MAXIMUM LOADS TO BE OBSERVED IN THE CASE OF WAGONS INCORPORATED IN FAST TRAINS CAPABLE OF RUNNING AT A MAXIMUM SPEED OF 120 km/h 75 m.p.h. (TO BE SHOWN ONLY ON /SS/ WAGONS.)

DIAGRAM No. F1/2/7



BR 20905/9
Model
Modèle K

BRITISH RAILWAYS – CHEMINS DE FER BRITANNIQUES

Vehicle
Véhicule

Not to be reloaded
To be returned home after unloading
A ne pas recharger
à rapatrier après déchargement

Defects: (Underline headings applicable)/**Défectuosités:** (Soulinger les expressions qui conviennent)

1. Wheel sets/Essieux montés
2. Axle boxes/Boîtes d'essieu
3. Brakes/Frein
4. Underframe (wagon/bogie)
   Châssis (véhicule/bogie)
5. Suspension gear/Suspension
6. Draw gear/Appareils de traction
7. Buffing gear/Appareils de choc
8. Body/Caisse
9. Roof/Toiture
10. Doors/Portes
11. –
12. The vehicle has been derailed
    Le véhicule a déraillé
13. Overhaul period has expired
    Révision périmée
14. –
15. Tank/Réservoir
16. Locks and cover plates on tanks
    Fermeture et armatures de réservoirs
17. Roof not watertight
    Toit non étanche
    Body not watertight
    Caisse non étanche
    Tank not water/airtight
    Réservoir non étanche
    Container not watertight
    Conteneur non étanche
21. Windows/Fenêtres
22. Heating/Chauffage
23. Lighting/Eclairage
24. Vehicle interior
    Intérieur du véhicule
25. Toilet installations
    WC – Lavabos
26. Intercommunicating gangways
    Intercirculation
27. Inscriptions

Additional information:/Précisions supplémentaires: .....

.....

.....

(Office stamp)
(Timbre du service)

(Date stamp)
(Timbre à date)

(Signature)

Diagram F2/2 - Label BR 20905/9

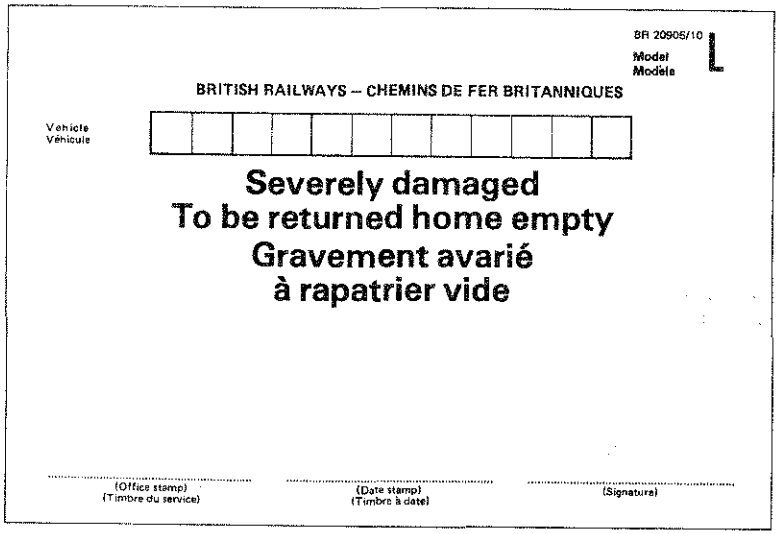
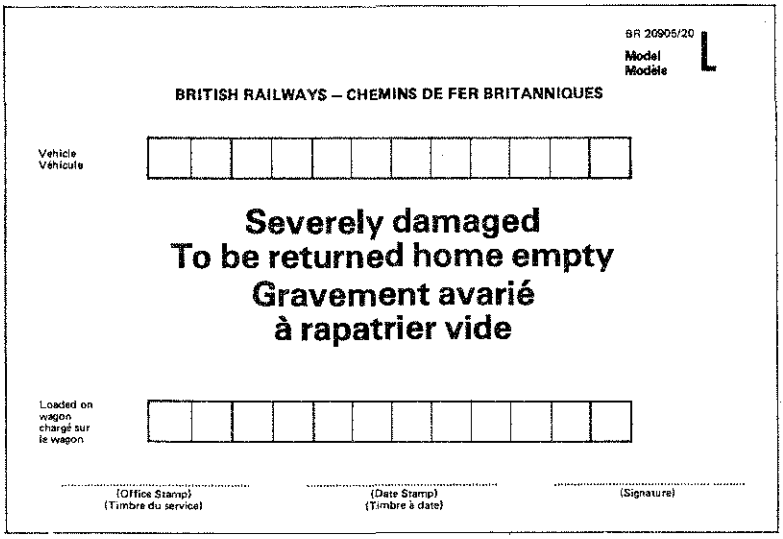


Diagram F2/3 - Label BR 20905/20 (Red) and BR 20905/10 (Blue)



BR 20905/11

Model / Modèle **M**

BRITISH RAILWAYS – CHEMINS DE FER BRITANNIQUES

Vehicle / Véhicule

To be examined
A examiner

Defects: (underline headings applicable)/**Défectuosités:** (souligner les expressions qui conviennent)

1. Wheel sets/Essieux montés
2. Axle boxes/Boîtes d'essieu
3. Brakes/Frein
4. Underframe (wagon/bogie) Châssis (véhicule/bogie)
5. Suspension gear/Suspension
6. Draw gear/Appareils de traction
7. Buffing gear/Appareils de choc
8. Body/Caisse
9. Roof/Toiture
10. Doors/Portes
11. Tare incorrectly shown Tare inscrite inexacte
12. Vehicle has been derailed Le véhicule a déraillé
13. Overhaul period has expired Révision périmée
14. Unsuitable spare parts used Utilisation de pièces de rechange étrangères
15. Tank/Réservoir
16. Locks and cover plates on tanks Fermeture et armatures de réservoirs
17. Roof not watertight Toit non étanche
    Body not watertight Caisse non étanche
    Tank not water/airtight Réservoir non étanche
    Container not watertight Conteneur non étanche
21. Windows/Fenêtres
22. Heating/Chauffage
23. Lighting/Eclairage
24. Vehicle interior Fittings, Accessories Intérieur de véhicule Aménagement Accessoires
25. Toilet installations/WC – Lavabos
26. Intercommunicating gangways Intercirculation
27. Inscriptions – Pictograms Inscriptions – Pictogrammes

Additional information:
Précisions supplémentaires: .....

.....

.....

(Office stamp) (Timbre du service) (Date stamp) (Timbre à date) (Signature)

Diagram F2/4 - Label BR 20905/11

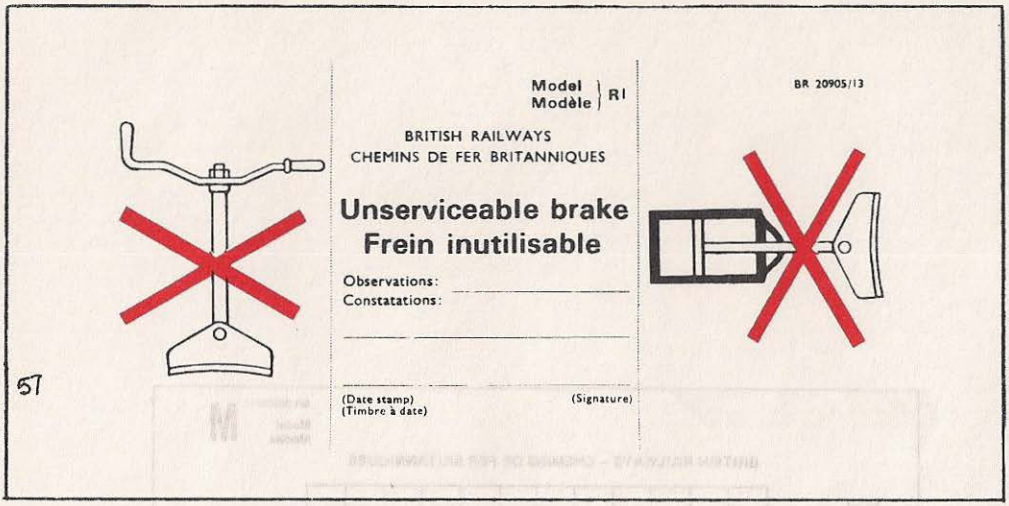


Diagram F2/5 - Label BR 20905/13

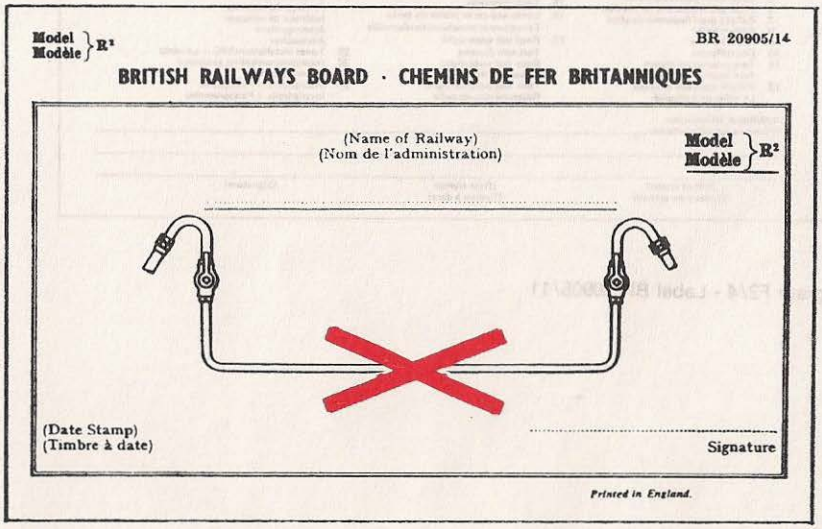


Diagram F2/6 - Label BR 20905/14

4. List of member Administrations of the R.I.V. Union

Administrations			
Name		Symbol	UIC Code Number
Raab-Oedenburg-Ebenfurt Railway ..	Sporon	GySEV	43
Budapest Transport Undertaking.....	Budapest	BHEV	44
German State Railway	Berlin	DR	50
Polish State Railways	Warsaw	PKP	51
Bulgarian State Railways	Sofia	BDZ	52
Roumanian Railways	Bucharest	CFR	53
Czechoslovakian State Railways.....	Prague	CSD	54
Hungarian State Railways.....	Budapest	MAV	55
Association of Private Swiss Railways for the supply of wagons	Berne	SP	62
North Milan Railways	Milan	FNM	64
Rjukan Railway	Oslo	RjB	65
British Railways	London	BR	70
Spanish National Railways	Madrid	RENFE	71
Jugoslavian Communal Railways	Belgrade	JZ	72
Hellenic Railways Organisation	Athens	CH	73
Swedish State Railways.....	Stockholm	SJ	74
Turkish Republican State Railways....	Ankara	TCDD	75
Norwegian State Railways	Oslo	NSB	76
German Federal Railways	Frankfurt-on-Main	DB	80
Austrian Federal Railways	Vienna	OBB	81
Luxembourg National Railway Company	Luxembourg	CFL	82
Italian State Railways	Rome	FS	83
Netherlands Railways	Utrecht	NS	84
Swiss Federal Railways	Berne	SBB/CFF	85
Danish State Railways	Copenhagen	DSB	86
French National Railway Co.	Paris	SNCF	87
Belgian National Railway Company ..	Brussels	Ⓑ	88
Iranian State Railways	Teheran	RAI	96
Syrian Railways	Alep	CFS	97
Irakian Railways	Bagdad	IRR	99

G. Technical Information for Examiners

1. General

G1/1. The information in the following sections is provided to assist examining staff to understand the features they are likely to be called upon to deal with when examining and attending to vehicles and to give the commonly used dimensions and standards which must be worked to.

G1/2. Instructions for the maintenance of rolling stock are contained in such publications as :—

B.R. 10907—Maintenance of Locomotive Hauled Coaching Stock at Outstations and Depots.

B.R.12013 - Standard Examination - Job Descriptions - Diesel Multiple Units

B.R.12014 - Standard Examination Schedule - Diesel Multiple Units

B.R. 11883—Regulations for Repairing Wagons

and various maintenance manuals, engineering instructions and standing orders relating to particular types of vehicles or components.

Information from these publications is made available, as required, to staff engaged upon vehicle maintenance and repair.

G1/3. If an examiner requires additional information he should make a request to his C. & W. Supervisor.

2. Wheels, Axles and Tyres

G2/1. In all cases when a vehicle is examined it must be ensured that the wheels and axles are in good and safe condition.

G2/2. Defects occurring in wheels, axles and tyres not brought about by normal wear are to be reported specially in each case on the appropriate report form and drawn specially to the attention of the C. & W. Supervisor who must authorise any movement of the vehicle to depot or otherwise instruct on its disposal. This will include all cases of fracture.

G2/3. Condition of Tread and Flange of Wheel/Tyre.

Examine for defects or damage to tread and flange of wheel or tyre, examples being as follows:—

(a) An uneven pattern of flange wear may indicate a bent axle.

(b) Flats caused by wheels skidding. Unless otherwise restricted freight vehicles can remain in traffic with flats not more than 2½" long. On Coaching Stock the examiner must draw the attention of the C. &.W supervisor to any flats which are detected.

(c) Shelling or pitting where areas of the tread surface fall out due to development of shallow fractures in the tread surface. Vehicles are not to remain in service with this defect except where the damage area is small and the C. & W. supervisor's authority has been obtained.

(d) Scaling or build up of metal on the tread brought about by excessive temperature at the braking surface. This may indicate a dragging brake. In most cases the effect of this type of damage is slight and it is permissible for the vehicle to remain in traffic after ensuring that the brake is operating satisfactorily. Advice should be obtained from the C. & W. Supervisor.

(e) Malformation of flange, either by actual wear or by the swaging of the metal to form a ridge on which a $^{3}/_{16}$"radius gauge will rock.

G2/4. Security of Tyres.

If a loose tyre is found or suspected the vehicle must be withdrawn from traffic immediately. Loose tyres can be detected with experience by the sound given off when struck by a hammer; the brake blocks should be free of the wheel during such test. Rust or a break in the continuity of the paint or dirt at the angle formed by the tyre lip and the wheel centre would provide visual evidence of a tyre which has moved circumferentially or a gap at this point would indicate outward movement of the tyre. The retaining ring in the back of the tyre must always be tight.

Tyres can become loose from overheating caused by dragging brakes and any tyres which are found hot or discoloured from previous over-heating must be examined specially for possible looseness or other defect.

If a case arises where a tyre has been overheated and appears to have moved but is found apparently tight, the vehicle must be held out of traffic for further inspection.

G2/5. Security of Wheels on Axles.

Look for signs of movement between the wheel boss and the axle wheel seat or any fracture in the wheel boss.

Vehicles must not be allowed to remain in service if there is evidence or suspicion of a fracture in a wheel, wheel centre or tyre or if an axle is bent or a tyre is loose or if the rim, tyre or flange thickness is less than the minimum by gauge.

G2/6. Wheel/Tyre Profiles.

1. Profile Types.

P1 Standard 1 in 20 Profile
*P2 Heumann Profile
P3 U.I.C. Profile (for wheels greater than 840 mm diameter)—width 135 mm
P4 U.I.C. Profile (for wheels 840 mm diameter and less)
P5 Profile—width 127-135mm.
P6 R.D. 5 Profile
*P7 R.D. 5A Profile
P8 R.D. 4 Profile

NOTE: * Indicates Non-Standard Profiles.

2. Profile Identification.

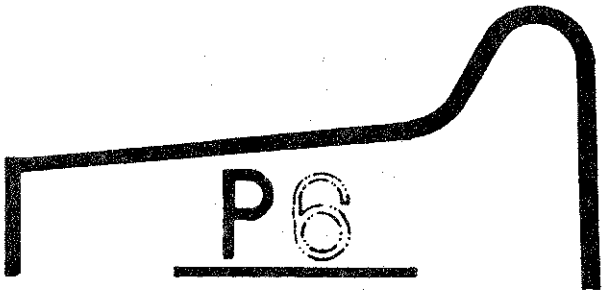
The Profile Identification letter and number are stamped in $\frac{3}{8}$" high characters and are located as follows:—

(a) Built-up Wheels.
On the outside of the tyre adjacent to the cast number etc.

(b) Solid Wheels.
On the inner side of the boss following the 'B.R.' stamp or following the last digit of the Private Owners marking.

The type of wheel/tyre profile fitted to a vehicle is identified by a symbol which is painted in white and positioned as shown in the diagrams.

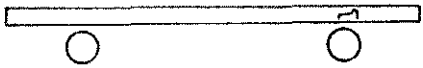
Profile Identification Symbol



NOTE :—

Digit to suit appropriate profile to be painted in white in the latest rail alphabet, the symbol being positioned as shown below.

On R.H. bogie solebar on bogie vehicles.



On solebar over R.H. wheel on non-bogie vehicles.

G2/7. Wheel/Tyre Gauges.

Booklet MT11—'Tyre Profile and Wheel Gauges for Rolling Stock' contains a full description of the various types of gauges for checking wheel and tyre dimensions, together with detailed instructions regarding their use. Examiners will be issued with gauges according to requirements. Should the wheels of any vehicle be found to contravene the allowable limits stipulated, the vehicle should be withdrawn from service and have 'Not-to-go' labels B.R. 11222 attached in accordance with Section C2/1.

NOTE :

With the implementation of Booklet MT11 and the use of the gauges described therein, the measurement of wheel/tyre tread wear, hollow wear and flange thickness is based on different principles to those previously in general use.

(a) Flange Thickness—whereas previous practice has been for flange thickness to be measured at a position $^{9}/_{16}$" from the toe of the flange, the procedure now adopted is for this to be measured at a position on the flange $\frac{1}{2}$" beyond the tread circle. This position on the flange will, therefore, vary in accordance with the amount of tread wear sustained by the wheel. The gauges issued for general field use are of the 'Go-Not Go' type and are part of the combination 'Flange Thickness and Height Gauge'.

(b) Tread Wear—the procedure now adopted is for the dimension of such wear to be obtained by measuring the projection of the toe of the flange beyond the tread circle, i.e. 'flange height'. The gauges issued for general field use are of the 'Go-Not Go' type and indicate the maximum allowable flange height for each type of profile and are part of the combination 'Flange Thickness and Height Gauge'.

(c) Flange Toe Malformation—During the development of flange wear, some of the metal displaced may be swaged towards the toe of the flange, creating a build-up of such metal on the tread side of the toe which in certain circumstances could contribute towards the possibility of derailment. The diagram illustrates such a build up of metal and it will be appreciated that the malformation of the flange toe so created could, should the wheel concerned be negotiating facing points having a blade worn to such an extent as to present a flat top, cause the affected flange to run along the top of the blade and thus cause the vehicle to be derailed.

(d) Vehicles must be withdrawn from service for wheel attention, when the build-up of metal on the flange toe reaches such a condition as to allow a $^{3}/_{16}$" quadrant radius gauge to rock when applied to it.

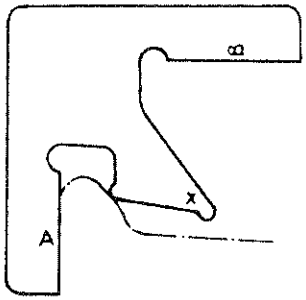


DIAGRAM G2/7(a)
MINIMUM FLANGE THICKNESS GAUGE

Face A of the gauge should be held firmly against the back of the wheel/tyre and moved toward the axle. If the stop marked X touches the wheel/tyre tread the flange is down to minimum thickness and the vehicle must be withdrawn from service for wheel attention.

If the unmarked stop touches the flange and thus prevents the stop X touching the tread, minimum flange thickness has not been reached.

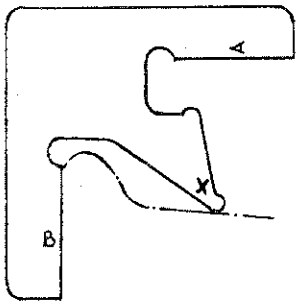
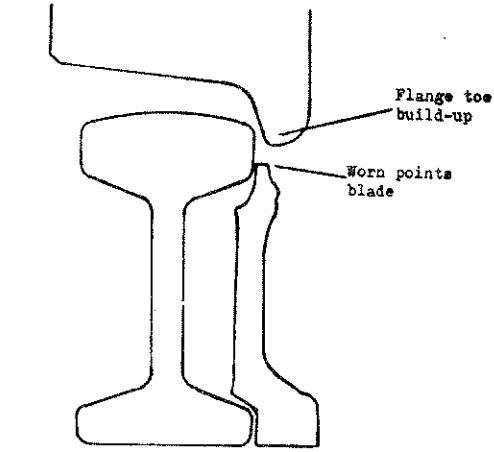


DIAGRAM G2/7(b)
MAXIMUM FLANGE HEIGHT GAUGE

To check for maximum flange height and thus maximum wheel/tyre wear, Face B of the gauge should be held firmly against the back of the wheel and moved toward the axle. If the toe of the flange touches the gauge thus preventing stop X touching the wheel/tyre tread, this denotes that maximum allowable flange height (and consequently maximum allowable tread wear) has been reached and the vehicle must be withdrawn from service for wheel attention.

If the stop marked X touches the wheel/tyre tread and thus prevents the toe of the flange touching the gauge, maximum flange height has not been reached.

G2/7
Contd



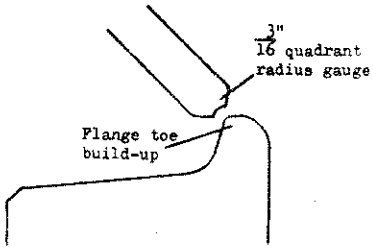


DIAGRAM G2/7(c)
EXAMPLE OF FLANGE TOE BUILD-UP AND WORN POINTS BLADE

If $^3/_{16}$" quadrant radius gauge will rock when applied to build-up, vehicle must be withdrawn for wheel attention.

DIAGRAM G2/7(d)
FLANGE TOE RADIUS GAUGE

G2/8. Variation in Wheel Diameters—The maximum variation allowed is as follows:—

1. Coaching Stock
   - (a) between the two wheels on one axle (after turning) ·010"
   - (b) between pairs of wheels on a bogie
     - Uncompensated brakegear $^1/_{16}$"
     - Compensated brakegear $\frac{1}{2}$"
   - (c) between the bogies on a vehicle 1"

2. Freight Stock
   - (a) between the two wheels on one axle (after turning) ·020"
   - (b) between pairs of wheels—4 wheeled wagons 1"
   - (c) between pairs of wheels—6 wheeled tank wagons $\frac{1}{8}$"
     (the wheelset with the smallest diameter should be in the centre)
   - (d) between pairs of wheels on a bogie $\frac{1}{2}$"
   - (e) between the bogies on a vehicle 1"

G2/9. Width of Wheels/Tyres (B.R. Profiles) - Minimum 4⅞" Maximum 5⅜"

G2/10. Length of journals—plain bearings. The maximum length allowed is as follows:—

1. Coaching Stock
   (a) Passenger Carrying: $^{1}/_{16}$" in excess of the specified length of a new journal.
   (b) Non Passenger Carrying: $^{3}/_{32}$" in excess of the specified length of a new journal.
2. Freight Stock
   $\frac{1}{8}$" in excess of the specified length of a new journal.

G2/11. Disc Brake Wheelsets.

Examine the braking surfaces for deterioration due to heat or mechanical damage, i.e. pitting, scoring or excessive blue spotting or surface fractures. In addition, examine the security of the braking discs according to type, thus:

(1) Brake disc mounted on axle between the wheels. Look for damage, fractures or signs of movement of disc on axle.

(2) Machined surfaces of wheel centres used as brake disc. Look for fractures in wheel centre, rim or boss or signs of movement of wheel on axle.

(3) Separate disc check plates which are bolted each side of the wheel centre. Look for fracture in wheel centre, rim or boss, possibly extending from bolt holes. Look for signs of movement of wheel on axle. Look for loose, fractured or missing cheek plate bolts or loose or missing nuts.

G2/12. Salt Wagon Axles.

Certain types of wagons (except Presflo) used regularly for salt traffic require to have their axles ultrasonically tested and the protective bituminous paint renovated at 3 yearly intervals, coinciding with the Classified Repair dates of the wagon.

3. Vehicle Springs and Suspension

G3/1. Defects to springs and suspension gear can cause risk of derailment and vehicles must be stopped for repairs if a suspension spring is broken or if a suspension component is worn or out of adjustment beyond limits laid down in maintenance instructions.

Defects to look for are :—

G3/2. Coil Springs.

(i) Fracture in one or more coils.

(ii) Displacement from correct position.

(iii) Incorrect height of spring shown by variations in underframe clearances and buffer heights.

G3/3. Leaf Springs.

(i) Fractures in plates. These may occur within the buckle and can often be detected by visual evidence of plate movement.

(ii) Buckle loose on plates or fractured.

(iii) Plates moved out of position.
Springs which have the plates located in the buckle by a rivet are to be rejected if there are signs of movement of the plates relative to each other. This movement indicates a broken rivet or plate. Springs without rivets in the buckle have plates and buckle with pressed dimples in the centre which engage with the adjacent plates. On this type of spring some lengthwise movement of the plates is permitted, the limits being :—

Top plate to buckle— Maximum movement $\frac{1}{4}$"
Other plates " — " " $\frac{1}{2}$"

(iv) Incorrect height of Spring.
The height is the measurement from the base of the spring buckle to the line of the centres of eyes or the tops of the hook ends of the top plate.
When wagon springs are tested in Works, the height is measured when the spring is under a load of 2 tons and this measurement is painted on the spring top plate. When springs are fitted to a wagon the springs must be matched (to within $\frac{1}{16}$") to this painted height. When it is necessary to replace a defective spring, both springs on the same axle must be changed unless the tare weight of the wagon is 12 tons or above.
On a wagon in service the variation in height between the springs on the same axle must not exceed $\frac{1}{4}$" when empty or $\frac{1}{2}$" when loaded. (This refers to the height as measured on the wagon and not to the painted figures.)
Note that spring heights should be measured when the wagon is standing on level track and that on loaded wagons a variation in height may be caused by spring defect or by unequal loading.
For the purpose of comparing spring heights on a wagon in service it is convenient to measure the distance from the topside of the top spring plate close to the buckle to the underside of the solebar.

This distance is shown as dimension 'X' in the suspension diagrams and must not vary more than the $\frac{1}{4}$" or $\frac{1}{2}$" quoted.

NOTE: Some wagons may have packing plates fixed permanently between the solebar flange and the spring shoes or scroll irons at one or two corners of the wagon to compensate for irregularities in the wagon frame. In such cases the thickness of the packing must be subtracted from the measurement taken from spring plate to solebar in order to obtain the true dimension 'X' for the corner.

(v) Duplex Leaf Springs (Two Stage).

These are fitted on some special type wagons which have low tare weights relative to their gross laden weights and can be recognised by the designed gap between the top and bottom group of plates when the wagon is in tare condition.

(vi) Fitting correct springs.

It is essential that the correct type of spring is fitted to a vehicle, not only in respect of the number and thickness of plates and length, but, since springs with the same number of plates may be manufactured to different height specifications to suit different designs of wagons, they must be correct in respect of height (See Section G3/3/iv).

Variations in the shape of the spring plate ends indicate differences in material and/or manufacturing specifications.

There are also variations in the manner of securing the plates within the spring buckle e.g. rivets, now gradually being superseded by an arrangement of pressed dimples which locate the spring plates with each other and within the buckle and, particularly on ferry vehicles, a system of keys or wedges.

Such variations are permitted on a wagon providing the requirements quoted in the first paragraph of this Section and in Section G3/3/iv are satisfied.

G3/4. Shoe Suspension.

The maximum allowable hollow wear on spring shoes on wagons in service is $^{3}/_{16}$". Spring shoes must be examined for fracture and for loose rivets. Spring shoes must be the same height on both sides of the wagon—excluding any permanent packing between the shoe and the solebar. The maximum allowable wear on the spring top plate at the hook ends where in contact with the spring shoe is $\frac{1}{8}$" i.e. minimum thickness of plate = $\frac{1}{2}$". Spring shoe bolts $\frac{3}{4}$" diameter must be fitted with the nuts and split pins to the outside so that they are visible (except at the position on some wagons where there is limited clearance from the hand brake lever).

G3/5. Eyebolt Suspension.

The eyebolts are in correct adjustment when:—

(a) the distance from the centre of the spring pins to the underside of the solebar is the same at each end of each spring on the same axle;

(b) the buffer heights are correct. (See Section G4/12.)

Unless eyebolt adjusting nuts are fitted with some other approved tight

locking device (e.g. as on wagons with combination single link and eyebolt suspension (Section G3/8), locknuts must be fitted and be securely engaged to the adjusting nut. Should any locknuts have worked loose and allowed condition (a) above to have been affected, the wagon should be labelled for repairs.

Look for abnormal wear at :—

Eyebolts in the eye and on the shank from contact with the scroll iron.

Spring plate eyes.

Spring pins.

NOTE :

Spring pins should be fitted with the split pins to the outside so that they are visible.

G3/6. Double Link Suspension.

Double link suspension is found on Continental wagons and also, sometimes with auxiliary spring-units, on many B.R. and privately owned wagons. There are also B.R. variations of this suspension, with wider components.

Wear on the links, pins and bearings increases the distance between the spring eye pin and the support bracket (scroll iron) pin. British vehicles must be withdrawn from service when the measured distance between the centres of the pins exceed the permitted maximum of 303 mm. ($11\frac{15}{16}$") or is not the same at both ends of the same axle.

The insertion of packing strips in the link bearings to compensate for wear is not permitted.

On suspensions of this type the pins, bearings and links are given lubrication attention when fitted but it is important that no oiling or greasing of these parts is carried out on wagons in service. The correct functioning of the suspension depends on the friction between the mating surfaces.

G3/7. B.R. Friction Link Suspension.

Vehicles should be withdrawn from service if the measured distance between the centres of the spring eye pin and the support bracket (scroll iron) pin exceeds $1'-2\frac{3}{16}$".

On suspensions of this type the pins, bearings and links are given lubrication attention when fitted but it is important that no oiling or greasing of these parts is carried out on wagons in service. The correct functioning of the suspension depends on the friction between the mating surfaces.

G3/8. B.R. Single Link Suspension with Eyebolt Adjustment.

This is fitted to high capacity hopper wagons and is a combination of link and eyebolt affording a means of adjusting the buffer height, particularly as affects door operating trunnion height and also for weight distribution.

Vehicles should be withdrawn from service if the measured distance between the link pin centres exceeds $5\frac{3}{16}$".

G3/9. Compensation for Reduction in Wheel Diameter due to Turning.

On vehicles with Double Link, B.R. Friction Link or B.R. Single Link with Eyebolt Adjustment types of suspension it is permissible, when wheels are turned or changed, to compensate for reduction in wheel diameter and restore buffer height, by fitting special packing pieces between the axle boxes and the springs of a thickness

appropriate to the reduction in the radius of the wheels. These packing pieces are termed 'cone blocks' (see diagram) and, when fitted for this purpose only, must be of the same thickness at both axleboxes of a wheelset.

G3/10. Compensation for Frame Twist.

1. Some wagons may, however, have been fitted with a cone block packing (or a packing of additional thickness to its partner on the same wheelset) at one wheel position only, in order to compensate for some degree of frame twist and obtain equal wheel weight distribution. In such cases it is necessary for the wagon to bear a special plate, giving details of this extra thickness, permanently affixed to the solebar immediately above the axlebox concerned.
   When springs are changed on any wagon bearing such a plate it must be ensured that the special packing is replaced in its correct position and when wheelsets are changed, (or wheels turned), should cone block packing of appropriate thickness be necessary to compensate for wheel diameter increase or decrease, as described in Section G3/9, care must also be taken to ensure that the additional packing dimension indicated on the special plate is catered for.
   Should any wagon be found to be fitted with cone block packings of unequal thickness on the same wheelset, yet not bearing the special plate indicating this requirement, "For Repair" labels, B.R. 11224 suitably endorsed, should be attached to the wagon, in accordance with Section C2/4.
2. A more satisfactory method of compensating for frame twist now adopted is for the appropriate packing required at a wheel position to be inserted between the sole bar flange and the spring shoes or scroll irons and thus become a fixed component of the wagon frame. A wagon so dealt with will have a letter 'Q' painted on the solebar near the G.R. plate. In the event of spring shoe or scroll iron replacement being required, any such packings must always be replaced.

G3/11. Taperlite Spring Suspension.

This suspension design is based on special side bearing springs (Taperlite), having only two plates, connected by vertical links to pairs of auxiliary coil springs. The coi springs provide auxiliary springing in the tare and lightly loaded conditions, but are 'stopped out' at higher loads, leaving only the Taperlite springs operative.

The connecting links move freely longitudinally to accommodate variations ir camber of the Taperlite springs and give lateral freedom through the special spherica bearings with which they are fitted.

Both vertical and lateral damping is provided by the incorporation of separate hydraulic dampers.

Restraint of axle movement is provided by traction rods connecting each axlebo› to a rubber spring mounted off the corresponding suspension bracket.

Damper spigots and swing link connections are lightly greased on assembly but no lubrication of the suspension must be carried out in service.

G3/12. Pedestal Suspension.

This is a form of suspension incorporating groups of coil springs at the axlebo›

positions instead of the conventional laminated springs. The support for these spring rests is provided by a pedestal type axlebox assembly.

This type of suspension cannot be adjusted in respect of buffer height, except by the fitting of special packing which requires Shop attention.

G3/13. Spring Suspension on Bogie Vehicles.

Coaching stock bogies usually have springs at axleboxes as well as at the bolster. Some have adjustable suspension bolts, but others have the height and clearances set by means of packing. Adjustment can generally only be done in shops.

Some freight bogie vehicles are not fitted with springs at the axleboxes and also have no means of height adjustment except by means of packing.

Most modern coaching stock and many freight bogie vehicles have bogies with a form of suspension incorporating groups of coil springs at the axleboxes, the support for these springs being provided by a pedestal type axlebox assembly.

All bogie vehicles must be examined to see that, when on straight and level track, the clearances are equal on each side between bogie frame and body frame and, where applicable, between bolster and bogie frame.

If there are uneven heights or clearances, examine for broken or defective bolster springs or distorted or fractured bolster or spring plank members.

Metal faced sidebearers are to be lubricated at the bearing surfaces and checked for clearance.

The lubrication and adjustment of bogies on coaching stock is normally dealt with at the periodic depot maintenance; on most wagons the minimum clearance between the side bearer blocks is ⅛" at each side, but there are variations.

Some vehicles have resilient (rubber or steel spring) mountings for the side blocks which are then in permanent contact; composition facing materials may be used on this type of side bearer block and these must not be lubricated.

It will be necessary to refer to the vehicle maintenance instructions for full information.

Suspension components which are defective or requiring adjustment will adversely affect the buffer height of the vehicle. (Buffer height details are given in Section G4/12.)

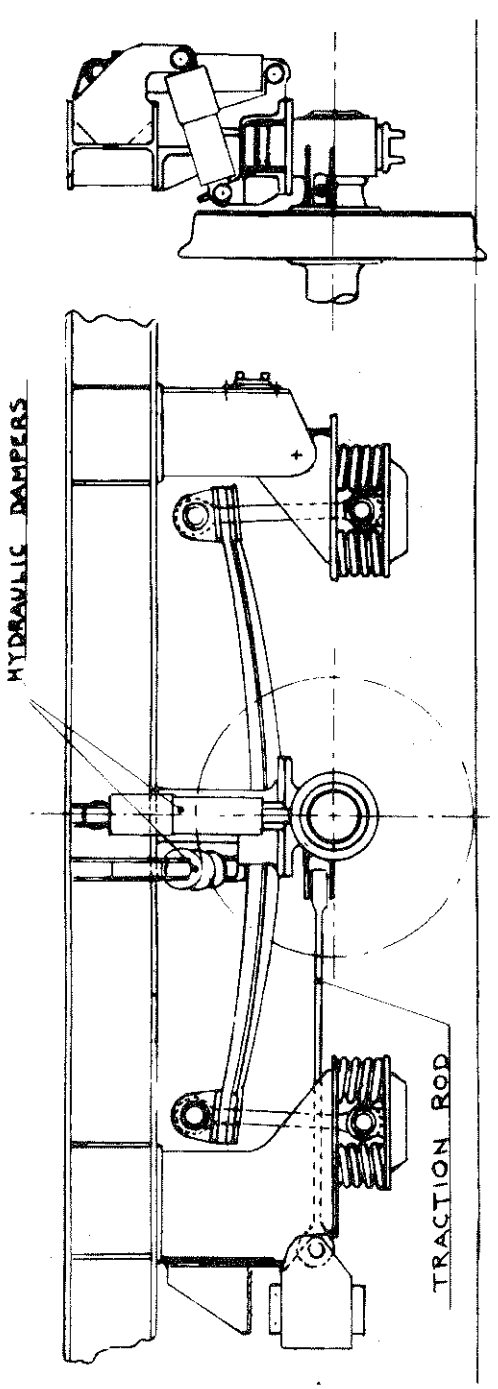
G3/14. Suspension Dampers.

Many vehicles, both bogied and two axled, are fitted with some form of suspension damping. On freight stock the dampers are generally of a type operating mechanically, by exerting pressure either on the axleboxes or the bogie bolsters according to design.

On coaching stock and some freight stock (e.g. wagons having Taperlite suspension) the dampers are of the hydraulic type. Dampers are generally checked for efficiency, wear etc. during vehicle maintenance, but Examining Staff should be alert for possible displacement or defects.

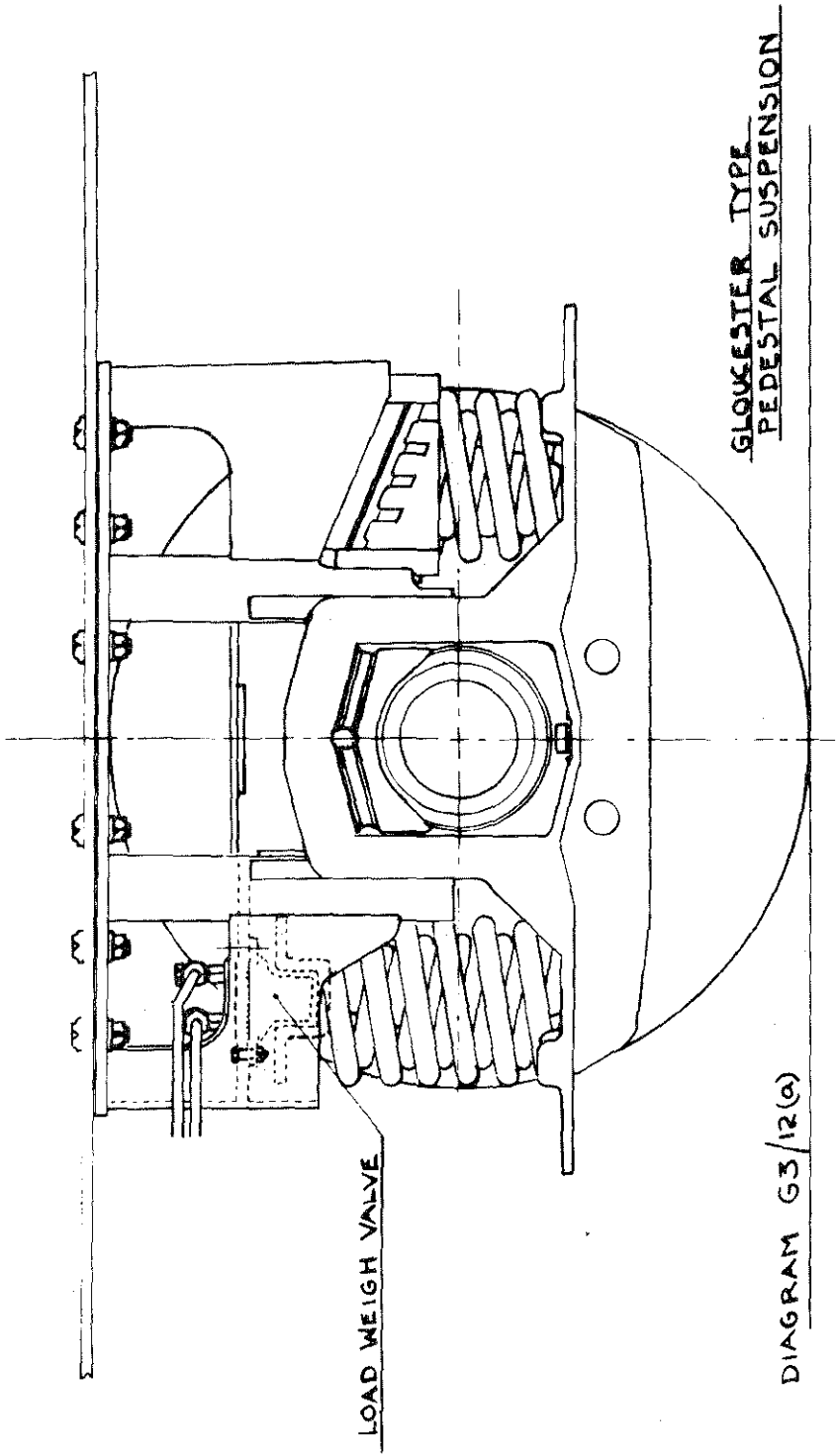
G3/15. **Temporary bolting of Bearing Spring Shoes—To enable a wagon to travel to a repair depot to have these items riveted they may be temporarily secured by bolts provided with grover spring washers and split pins. The wagon concerned must have 'For Repair' labels B.R. 11224 attached.**

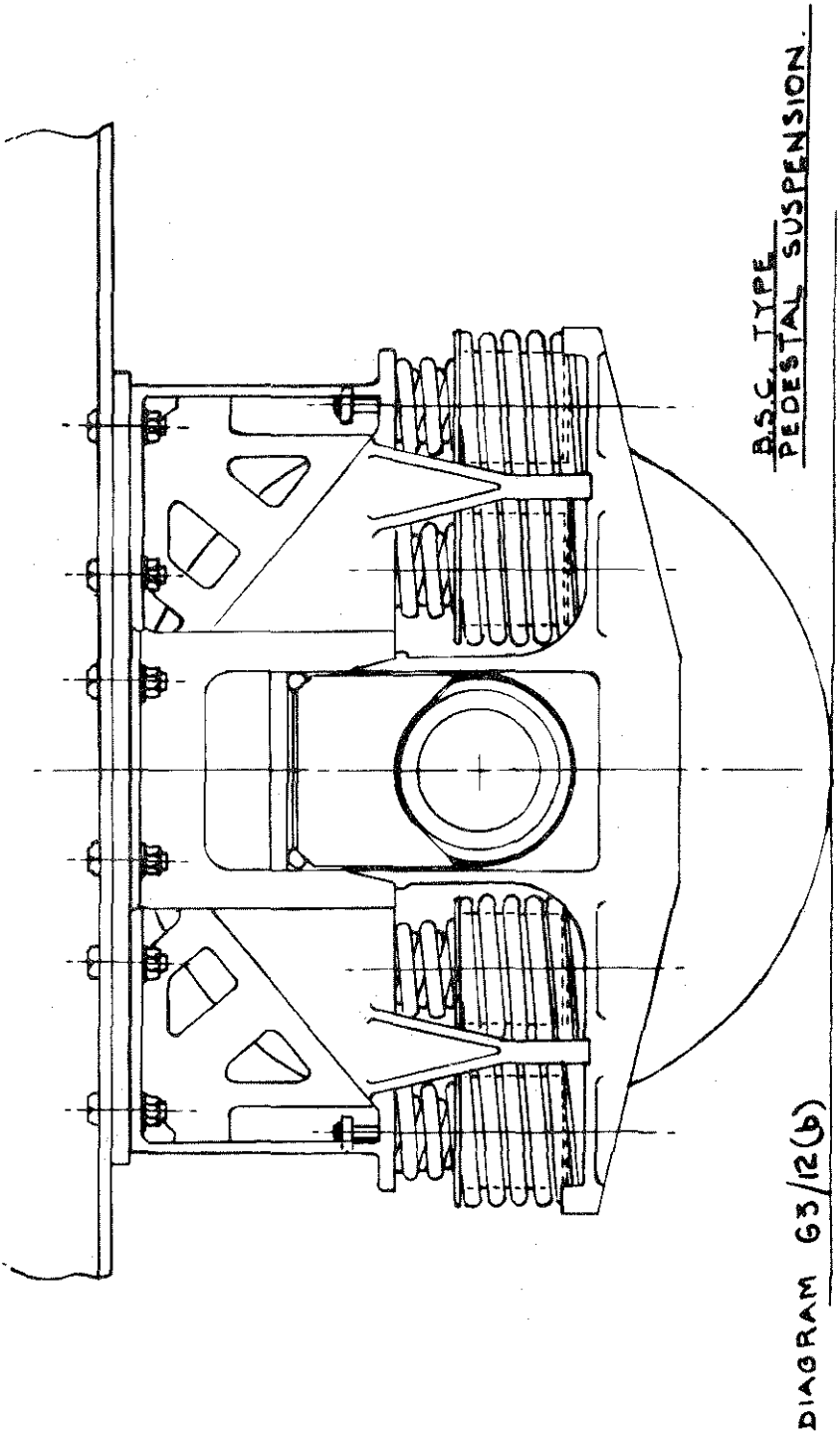
G3/16. **Temporary bolting of normally riveted Bearing Spring Stops—These may be secured by bolts having grover spring washers and split pins and the wagon allowed to remain in service. They must be riveted when the wagon next undergoes Depot/Shop repair.**

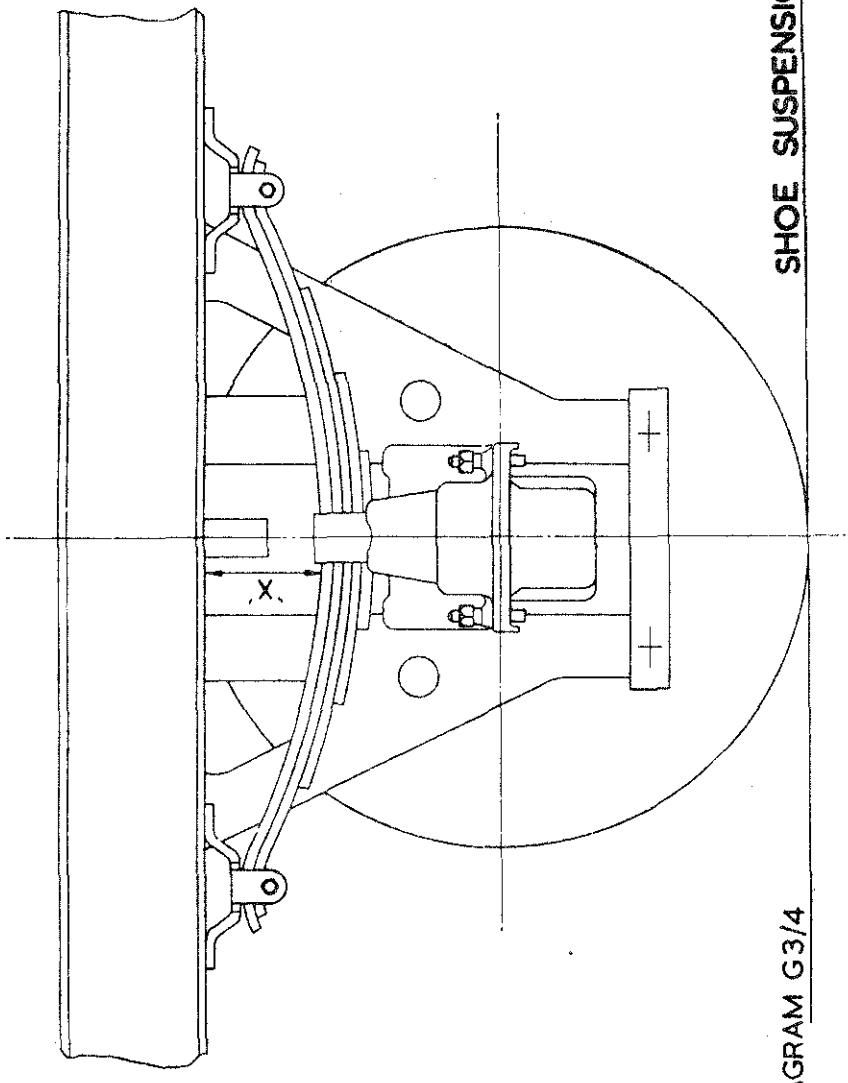


B.R. TAPERLITE SPRING SUSPENSION

DIAGRAM G3/11







SHOE SUSPENSION

DIAGRAM G3/4

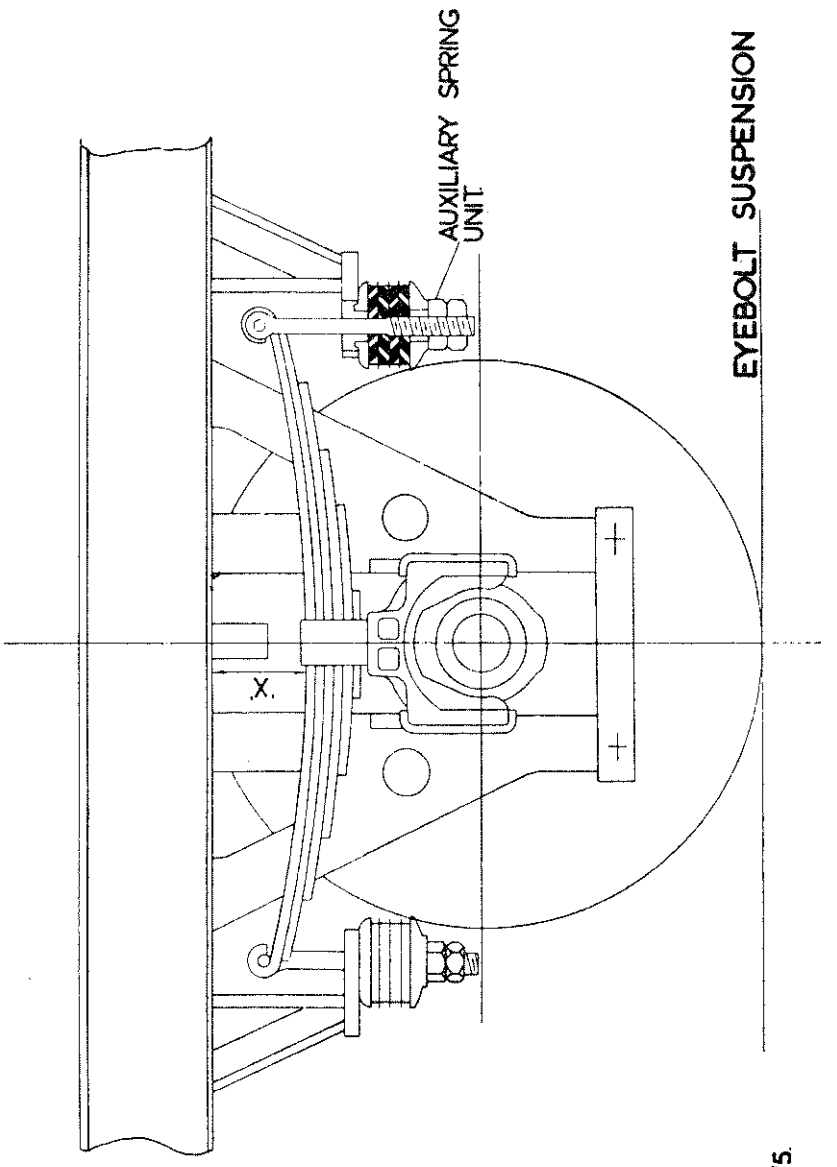
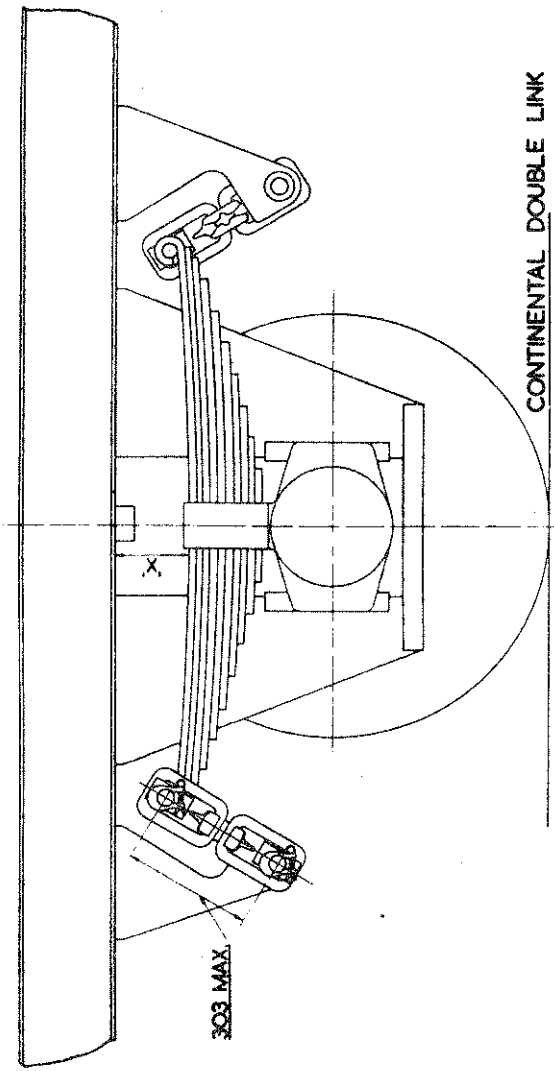
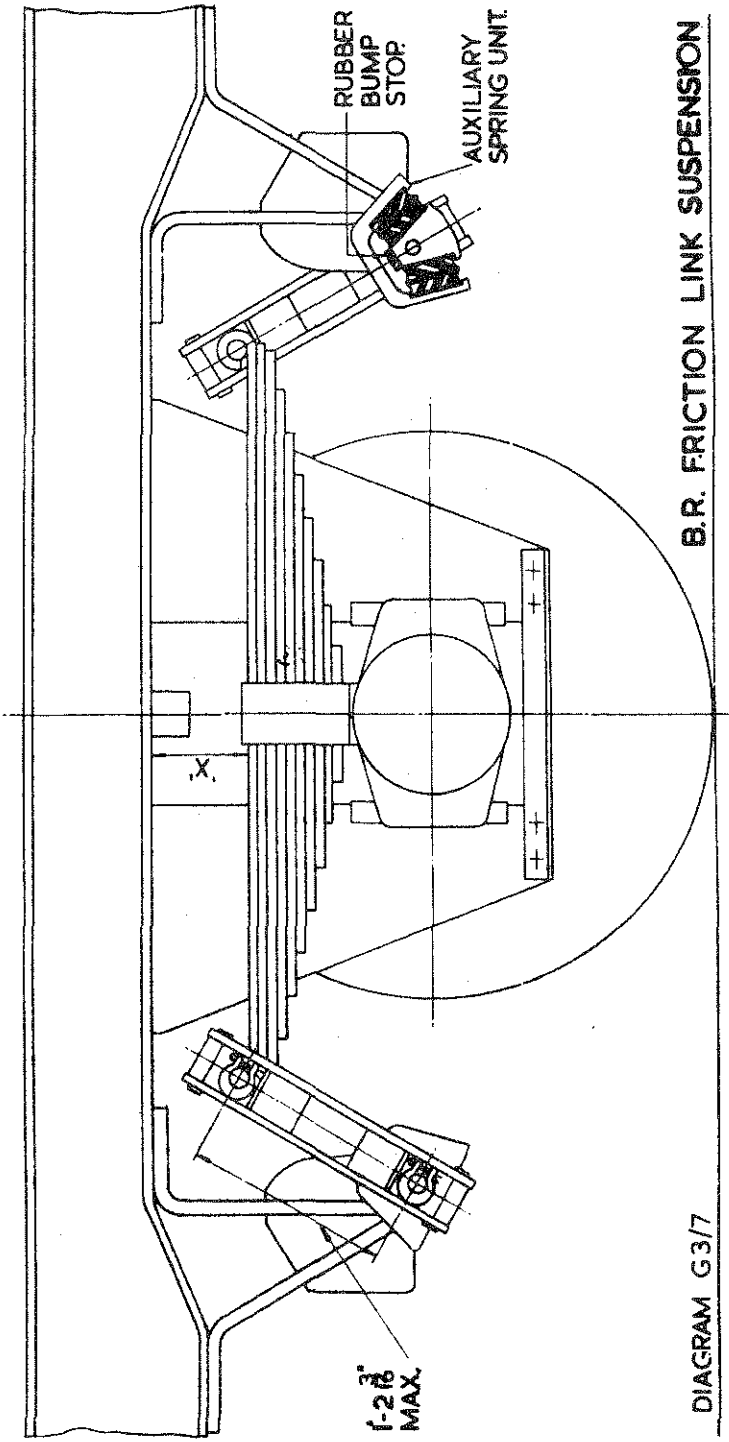


DIAGRAM G 3/5.



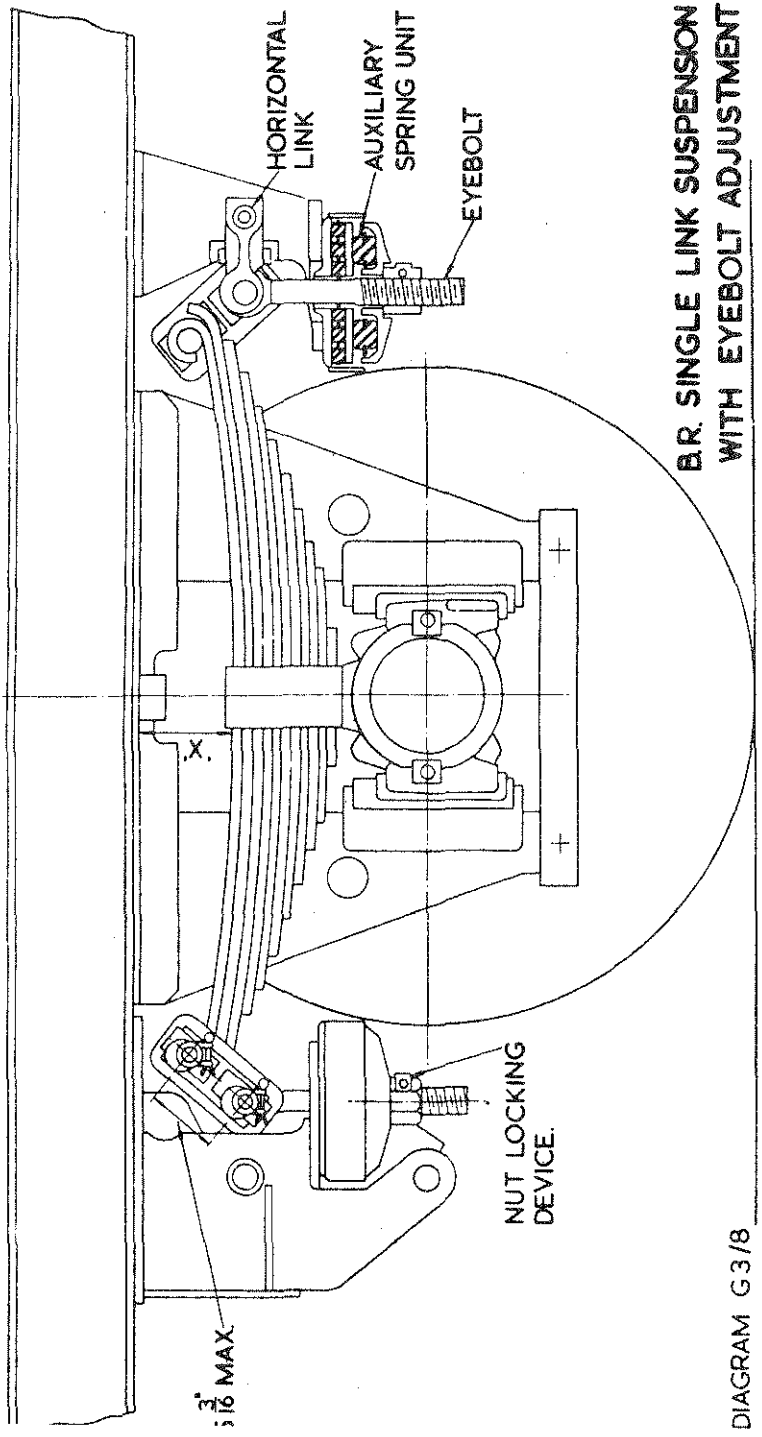
CONTINENTAL DOUBLE LINK SUSPENSION.

DIAGRAM G3/6



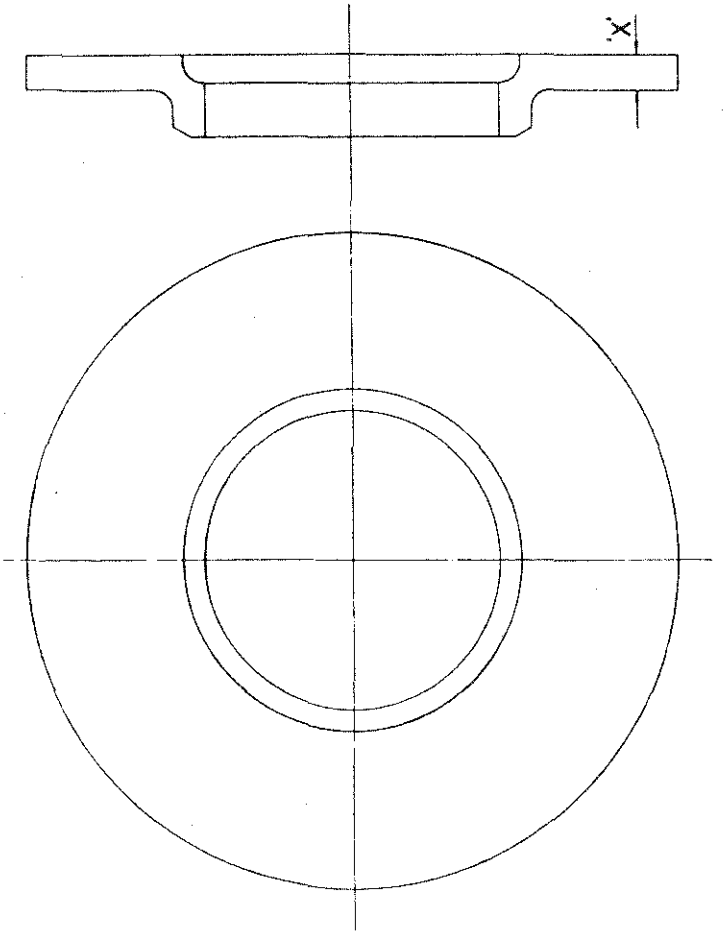
B.R. FRICTION LINK SUSPENSION

DIAGRAM G3/7



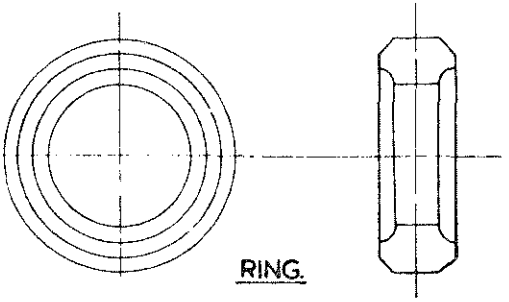
B.R. SINGLE LINK SUSPENSION WITH EYEBOLT ADJUSTMENT

DIAGRAM G3/8



RANGE OF STANDARD THICKNESSES M.M. "X"	5	10	15	20	25	35

CONE BLOCK.



RING.

DIAGRAM G 3/9.

RING & CONE BLOCK.

4. Buffing gear and gangways

G4/1. The two buffers at one end of a vehicle must be of the same type in all respects, with the correct size buffer head and length. The relationship of buffer projection from headstock, thickness of drawbar faceplate and the type of coupling used is given in Section G4/13.

G4/2. Buffer guides or casings must be firmly secured to the headstocks and buffer heads, plungers or spindles in good condition, not bent or badly worn.

G4/3. With spindle type buffers (which have the spring behind the headstock) the buffer springs must be sound, with the buffer spindle cotter in position and secured by the correct size split pin or ring.

G4/4. Self contained buffers which have the spring compressed within the buffer guide casing can be dangerous to handle when being removed if for any reason the back plate has become insecure from the casing. Other types have no backplate the spring being compressed against the headstock.

There are special instructions for the safe handling of these types of buffers and staff should be conversant with these before attempting to unbolt a buffer from its position on the headstock.

G4/5. Hydraulic buffers, which are also self contained, may be dangerous to handle, particularly if the buffer plunger is not fully extended.

There are special instructions for the safe handling of these buffers and staff should be conversant with these.

Hydraulic buffers do not require maintenance in service, but must be examined to see that there is no damage to head, plunger or casing and that the plungers, when not under compression, stand out to the full extent. A hydraulic buffer leaking oil, either around the plunger or from the casing, should be regarded as defective.

G4/6. Vehicles must not be lifted by attachment to hydraulic buffers.

G4/7. When dealing with mishaps, gas cutting equipment must not be used to burn off any part of a hydraulic buffer. The buffer must be removed as a complete unit.

G4/8. Wagons designed and formed to operate in permanently coupled sets may not be fitted with side buffers at the intermediate positions, but only at the outer ends of the sets. The buffing forces at the intermediate positions are taken through the drawgear and this must be taken into account during examination.

G4/9. Coaching vehicles fitted with automatic couplers and Pullman type gangways have retractable side buffers. These must be retracted when the automatic couplers are in use, but extended, with saddles fitted, when the automatic couplers are not in use. It is important that the buffer spindles are lubricated and free to be moved in and out and that saddles fit correctly and are secured by the tethering chains. When not in use the saddles must be hung on the hooks provided.

G4/10. When coaches are coupled with automatic couplers, the side buffers must be retracted out of use, the buffing forces being transmitted through the couplers, gangway faceplates or centre buffers, and plungers. Make sure that the gangway plungers are not sticking in as if this happens the gangway faceplates may be separated with risk of injury to persons passing through the gangway.

G4/11. Examine gangways for condition of covers, faceplates, plungers and tread plates. Check for security of end gangway shields and fastenings, when these are fitted.

G4/12. Permissible buffer and gangway tread plate heights, measured on straight, level Track, are as follows :—

Height from rail level to centre of buffer :—

Wagons passing out of Shops after repair

Maximum	3′ 6″
Minimum	3′ 3½′

Carflats passing out of Shops after repair

Maximum	3′ 6″
Minimum	3′ 5½′

Wagons in Service

Maximum	3′ 6″
Minimum unloaded	3′ 2½′
Minimum loaded	3′ 1″

Carflats in Service

Maximum unloaded	3′ 6″
Minimum unloaded	3′ 5¼″
Minimum loaded	3′ 4″

Coaching Stock (in service)

Passenger Vehicles and
Non Passenger Vehicles with gangways

Maximum unloaded	3′ 6″
Minimum unloaded	3′ 5¼″

Non Passenger Vehicles without gangways

Maximum unloaded	3′ 6″
Minimum unloaded	3′ 5¼″
Minimum loaded	3′ 3½″

Height from rail level to top of gangway tread plate

B.R. Standard Coaching Stock in Service

Maximum	4′ 3½″
Minimum Unloaded	4′ 2¾″

(These dimensions do not apply to certain D.M.U., E.M.U. and regional design coaching stock fitted with suspended type or scissor type gangways.)

When vehicles are coupled the maximum permitted variation in gangway treadplate heights on adjacent vehicles is ¾″.

G4/13. Determination of Correct Couplings on B.R. stock.

Type of Stock	Buffer Projection From Head-Stock	Thickness of Drawbar Faceplate measured From Headstock	Type of Drawhook	Correct type of Coupling
FREIGHT	1'6" (457)	3/4" (19)	BR Standard	BR Instanter
	1'8½" (520)	3/4" (19)	BR Standard	BR Standard Freight Screw
	1'8½" (520)	3.1/4" (95)	BR Standard	BR Instanter
	2'0½" (620)	2.1/16" (52)	Continental	Continental Screw
	2'0½" (620)	7.1/4" (184)	BR Standard	BR Instanter
	2'0½" (620)	6.7/16" (164)	Continental	Special Instanter to suit Continental Drawhook
	2'0½" (620)	4.3/4" (121)	BR Standard	BR Standard Freight Screw
Outer Freightliners without Captive Couplings	1'10" (559)	3/4" (19)	BR Special	Special Freightliner Screw carried on headstock bracket
CARRIAGE	1'10" (559)	3/4" (19)	BR Standard	BR Standard Carriage Screw

NOTE:
Most R.I.V. vehicles and some B.R. vehicles (e.g. 100 ton bogie steel wagons) are not fitted with drawbar faceplates.

G4/14. The stroke of buffers is generally 4½" on freight stock and 5" on coaching stock although there are some exceptions.

5. Drawgear and couplings

G5/1. Examine drawgear to see that components are in sound condition, in proper adjustment and correctly cottered. Look for signs of wear and/or straining of hooks, couplings, drawbars, links and pins and if necessary measure or gauge the item to establish whether suitable to remain in service. Ensure that associated frame members are not defective in any way.

G5/2. On some wagons and on coaching vehicles the drawbar faceplate in the headstock has a wide slot to allow the drawbar hook to move sideways when the vehicle passes over curved track. Examine for wear at the bottom of the slot and hook; if wear of the faceplate or hook is sufficient to allow the hook to rotate significantly out of vertical, the vehicle should be withdrawn for one or both items to be given attention

G5/3. Drawbar hooks require replacement if :-

(a) the hook is strained out of shape

(b) the tail rod is bent or worn at any point to a size less than 1 ½" in diameter or the screw threads are stripped or badly worn.

(c) they are worn to such an extent as to contravene the maximum/minimum dimensions shown in the diagrams.

G5/4 The building up of worn drawbar hooks by welding is not permitted. Repair to drawgear components may be carried out only at Works which have approved facilities for heat treatment after repair.

G5/5. Instanter couplings must be changed if there is wear or straining exceeding the limits shown in Section G5/13/1.

G5/6. Screw Couplings must be changed if:—

there is wear or straining exceeding the limits shown in Section G5/13 to shackles, trunnions or screws, or if the shackles are stiff in the trunnions or the trunnion nuts stiff on the screw and this cannot be corrected by lubrication.

Vehicles must not be in service with stiff couplings as this can be the cause of uncoupling.

G5/7. The standard screw coupling for freight vehicles has one shackle 9⅛" and one 13⅛" long (from centre of trunnion to inside of D). The standard screw coupling for coaching vehicles has one shackle 10⅛" long and one 14⅛" long. In each case the longer shackle has a gedge flat' enabling it to be attached to the drawhook through the 'gedge slot'.

G5/8. Continental screw couplings are fitted on wagons in international traffic and on some B.R. wagons. This coupling is connected by links and pin to the continental type drawhook and is not interchangeable with a gedge type coupling.

When a vehicle with Continental screw couplings is to be coupled to a vehicle with either B.R. screw couplings or Instanter couplings, the Continental screw coupling must be used.

G5/9. Emergency couplings are located in Guard's compartments of coaching

stock fitted with automatic couplers.

They are used for coupling vehicles hook to hook and have both D shackles of equal length and without a Gedges flat. The standard emergency coupling is painted red and has D shackles 10¼" long from centre of trunnion to inside of D.

When an emergency screw coupling is brought into use between coaches, the buffers must be extended and saddles fitted and the vestibule doors must be locked. Labels BR 11224 should be attached.

G5/10. Freightliner outer wagons carry on a headstock bracket a coupling which is similar to the emergency coupling but with shackles 9⅛" long. 'These couplings are generally painted yellow but when manufactured from stronger steel are painted green.'

G5/11. Standard screw couplings for freight stock may be manufactured from stronger steel and are stamped 10.F on one face of each shackle and painted green for identification purposes.

G5/12. When a wagon with screw couplings is to be coupled to a wagon with instanter couplings, except on Class 9 trains, the screw coupling must be used. On Class 9 trains, the instanter couplings may be used but must be in the long position.

G5/13. Minimum/Maximum Dimensions—Couplings.

1. Instanter Couplings.
   End links (all types)—Minimum thickness of links at ends. 1 3/16".
   Minimum distance between sides—2⅜".

   Instanter Links

   (a) Round Section—Welded type
   Minimum thickness of link in short or long position, 1 11/16".
   Maximum inside length 10⅜" in long position.

   (b) Oval Section—Stamped type
   Minimum thickness of link at top 1¾" in long position.
   Minimum thickness of link at bottom 1 7/16" in long position.
   Minimum thickness of link 1⅞" in short position.
   Maximum inside length 10⅝" in long position.

   (c) Flat or Fluted Section—Stamped Type
   Minimum thickness of link at top 2¼" in long position.
   Minimum thickness of link at bottom 1 15/16" in long position.
   Minimum thickness of link 2⅜" in short position.
   Maximum inside length 9⅞" in long position.

   The inside length of Instanter couplings must not exceed 2' 8" and they must also clear the rail level by 4" when in their lowest position with the wagon loaded, and if shortened during repairs they must not be less than the standard inside length of 2' 6¾" between links.

2. Standard B.R. Screw Couplings.

	Min./Max. Dimensions
(a) End of shackle	1 3/16" minimum

(b)	Side of shackle	1 9/32" minimum
(c)	Diameter of trunnion end	1 3/8" minimum
(d)	Diameter of thread of trunnion	1 15/16" maximum*
(e)	Diameter of screw thread	1 13/16" minimum*
(f)	Dimension from edge of hole to end of shackle eye	7/8" minimum
(g)	Difference between diameter of screwed bar and thread in trunnion	3/32"
(h)	Width between sides of shackles	2 3/8" minimum

*The dimensions shown in (d) and (e) are applicable only when the difference of 3/32" under (g) is not exceeded.

3. Continental Screw Couplings.

		mm	
(a)	End of shackle	35	1 3/8" minimum
(b)	Side of shackle	29	1 9/64" mimimum
(c)	Diameter of trunnion end	42	1 21/32" minimum
(d)	Diameter of trunnion thread	*51·5	2 1/32" maximum*
(e)	Diameter of screw thread	*48·5	1 29/32" minimum*
(f)	Dimension from edge of hole to end of shackle eye	22	55/64" minimum
(g)	Difference between diameter of screwed bar and thread in trunnion	2·5	3/32" maximum
(h)	Drawbar and coupling pin	50	1 31/32" minimum
(i)	Width between sides of shackle	60	2 3/8" minimum

*The dimensions shown in (d) and (e) are applicable only when the difference of 2·5 mm under (g) is not exceeded.

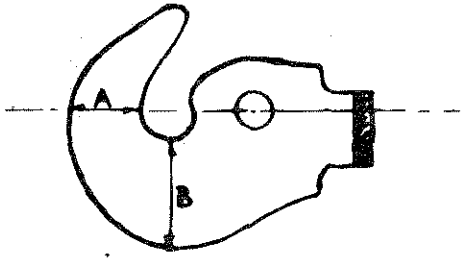
G5/14. Buckeye automatic couplings.

When in use, the examiner must ensure that the coupler support pin is correctly fitted with the tail pieces turned down and that the vertical lock has dropped fully. The pivot pin must be correctly cottered and the uncoupling chain free from obstruction so that the release lever is not in contact with the bottom of the vertical lock.

G5/15. Temporary bolting of normally riveted components of freight stock.

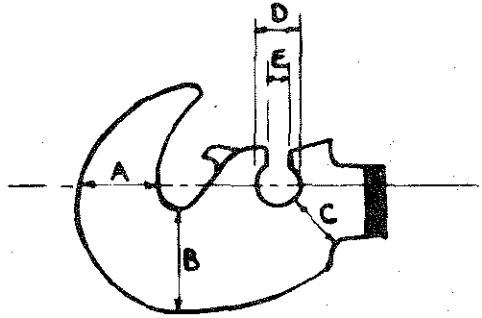
Drawbar cradle carrier angles and drawbar plates or castings which are normally riveted may be temporarily secured by bolts having grover spring washers and split pins and the wagon allowed to remain in service. They must be riveted when the wagon next undergoes Depot/Shop repair.

CONTINENTAL



A — 64mm Min.
B — 106mm Min.

BR STANDARD



A — 2 13/16" Min. (51mm)
B — 3 7/8" Min. (98mm)
C — 2 1/4" Min. (57mm)
D — 2" Max. (50mm)
E — 1 3/16" Max. (25mm)

DIAGRAM G5/3

MAXIMUM AND MINIMUM DRAWHOOK DIMENSIONS

6. Brake Gear

G6/1. Brake equipment on freight and coaching stock must always be given close attention to ensure efficient operation.

G6/2. Brake Rigging.

1. See that all brake pins are in good condition and properly washered and secured with sound split pins.
2. All blocks are clear of the wheels in the 'Brake Off' position. The clearance is specified in the maintenance instructions for some classes of vehicle but otherwise it should be between $\frac{1}{8}$" and $\frac{1}{4}$".

G6/3. Brake Blocks.

1. Cast iron brake blocks are fitted to most vehicles but some freight and coaching vehicles have modified brake gear with composition brake blocks. A different leverage is required for composition blocks and it is of great importance that only the correct type of block is fitted. Cast iron and composition blocks must not be interchanged.
2. Brake blocks must be replaced when worn to $\frac{5}{8}$" thick at the thinnest part of the block or at any time if fractured. In the case of separate blocks and carrying shoes, ensure that the key has sufficient set to secure the block tightly and cannot drop through too far. On coaching stock and mineral wagons a ¼" split pin must be fitted to the bottom of the key to prevent it being thrown out.

G6/4. Disc Brakes.

1. Inspect brake pads for security and wear and discs for signs of fracture.
2. Refer to vehicle maintenance instructions for information on fitting and adjusting.
3. On vehicles in service, when the brake is fully released there must be a minimum of $^1/_{32}$" total clearance between the disc and the pads. On many vehicles the maintenance instructions call for clearance greater than this when fitting pads or adjusting the brake but it is not necessary to delay vehicles in transit as long as the $^1/_{32}$" minimum is obtained. The $^1/_{32}$" total clearance may be both pads clear of the disc by $^1/_{64}$" or one pad clear by $^1/_{32}$" when the other pad is in contact with the disc.
4. Vehicles must not remain in service with the brake operative if the brake pads are worn to $\frac{1}{4}$" thick or less.
5. A shoulder is generally provided at the ends of the pad to give visual indication of the limit of wear. The pad requires changing when worn to the shoulder indicating that the $\frac{1}{4}$" minimum thickness limit has been reached. Some bogie wagons, however, are fitted with larger (Jumbosize) pads which do not have this shoulder, but these also require renewal when worn to $\frac{1}{4}$" thickness.

G6/5. Hand brakes.

1. All freight vehicles must have hand brakes which are capable of being operated from both sides of the vehicle. On some articulated or permanently coupled wagon sets, hand brakes may be fitted only to the end wagons of the sets. On some bogie vehicles the hand brake operates independently on each bogie.
2. Ensure that the handbrake is correctly adjusted according to the maintenance instructions for the class of vehicle, operates freely, is lubricated and observe the following features.
3. Lever type hand brake
   See that the lever is secure on the brake shaft and is set with sufficient clearance from other wagon parts so that there is no risk of injury to the hands when operating the brake. There must be enough inward spring on the lever to ensure that it cannot jump out of the brake guard rest.
4. The lever must never move to the bottom of the guard when the brake is fully applied using a brake stick. Allow for the fact that the amount of movement of the brake lever may be different when the wagon is loaded from that when empty owing to the variation in the height of the brake blocks relative to the centre line of the wheels or to the effect on the brake leverage of the 'Empty/loaded' power brake control on some classes of wagons.
5. In general, on an empty wagon, the blocks should be brought against the wheels when the lever has moved down the guard not more than 4 holes, but be clear of the wheels when the lever is in the rest. The handbrake requires adjustment if the lever can be depressed, by hand, below the 5th pin hole from the bottom of the guard.
6. The brake lever guard pin must be intact and not hang lower than 6" above rail level when the wagon is loaded.
7. Wheel type hand brake
   Fitted to heavy freight vehicles and non-passenger coaching stock. Ensure that the brake can be fully applied without an excessive number of turns (a brake requiring 12 or more turns requires adjustment), can be operated freely and does not jam in the 'Brake Off' position as this can give the false impression that the brake is hard on. Ensure that 'On/Off' direction signs are clearly legible and give the correct indication and that hand brake indicators, when fitted, operate correctly.

G6/6. Hydraulic handbrake.

1. This system is used on certain coaching stock trains fitted with disc brakes and the handbrake is applied by means of a hand pump situated in the guard's compartment. The maintenance of this brake gear will be in accordance with Westinghouse Brake leaflet 70052 sheet No. 8 and the S.A.B. Brake Regulators Co's maintenance instructions. The operation of the brake is as follows:—
2. Train in Service.
   (a) There must be the correct amount of fluid in header tank.

(b) The selector valve lever must be in 'Neutral' position and the indicator gauge showing 'OFF'.

(c) The hand pump lever must be in clipped position in guard's compartment.

3. To apply Brake.

(a) Move control lever to the 'Apply' position.

(b) Fit pump handle to pump and start pumping.

(c) Keep pumping until indicator shows 'On'. This will require approximately 20 strokes of the pump.

(d) Remove pump handle and place in clip.

(e) Move control valve lever to the vertical (Neutral) position. The parking brake is now locked on.

4. To release Brake.

(a) Move control lever to the 'Release' position.

(b) Fit pump handle to pump and start pumping.

(c) Keep pumping until the indicator shows 'Off'. This will require approximately 4 strokes of the pump.

(d) Remove pump handle and place in its clip.

(e) Move control valve lever to the vertical (Neutral) position. The parking brake is now released.

If the brake does not apply with the normal number of pump strokes the brake must be regarded as defective and appropriate action taken.

G6/7. Electric hand brake.

Certain electrical multiple unit sets have been fitted with electrically operated parking brakes which are actuated by switches in the driving cabs and guards van. There is also a hand generator in the guards van which can be used to operate the brake if the normal electrical supply has failed. Staff required to operate or maintain this equipment will be supplied with the necessary instructions. Staff who have not received such instruction should not attempt to operate or interfere with this equipment.

G6/8. Hand brakes in Guards' Brake Vans.

It is of particular importance to inspect brake vans to see that the hand brake works freely and is in correct adjustment.

G6/9. Brake Automatic Slack Adjusters (Single Acting).

1. These are fitted to some railway owned and privately owned vehicles and operate in such a manner as to take up automatically to compensate for wear on the brake blocks or pads and in the brake rigging, and thus to maintain the clearance between blocks/pads and wheels at the correct dimension. They operate in one direction only, i.e. to tighten up the brake adjustment and are not capable of automatically slackening off the brake adjustment if for any reason there should be insufficient clearance between the blocks/pads and wheels.

2. To fit new brake blocks/pads the slack adjuster must be released sufficiently to provide enough clearance for the blocks/pads. One or more applications of the hand or power brake will then set the brake with the correct block/pad clearance. Hand adjustment to any other part of the brake gear (e.g. pin and hole adjustment) must not be made.

3. Many freight vehicles having air operated disc brakes are fitted with combined brake cylinder/slack adjuster units to control brake pad clearances. The S.A.B. type unit illustrated operates on a rotary principle and incorporates a clutch operated take-up mechanism which enables very fine adjustment according to pad wear. Resetting of this type of brake unit to fit new brake pads is by turning the adjusting nut in an anticlockwise direction, using a 12 mm ring spanner.

G6/10. Brake Regulators (Double Acting Slack Adjusters).

1. These are fitted to most air braked and to some vacuum braked vehicles, both railway and privately owned. They differ from the single acting slack adjusters in that they will automatically not only tighten up but also slacken off the brake adjustment to maintain the required block/pad clearance.

2. The regulator generally forms part of a brake pull rod and has a barrel portion containing the mechanism which decreases or increases the effective length of the pull rod and thus controls the brake block/pad clearance.

3. When fitting new brake blocks or pads the regulator barrel should be adjusted manually to provide the required clearance. After fitting the correct working clearance will be obtained by making one or two brake applications.

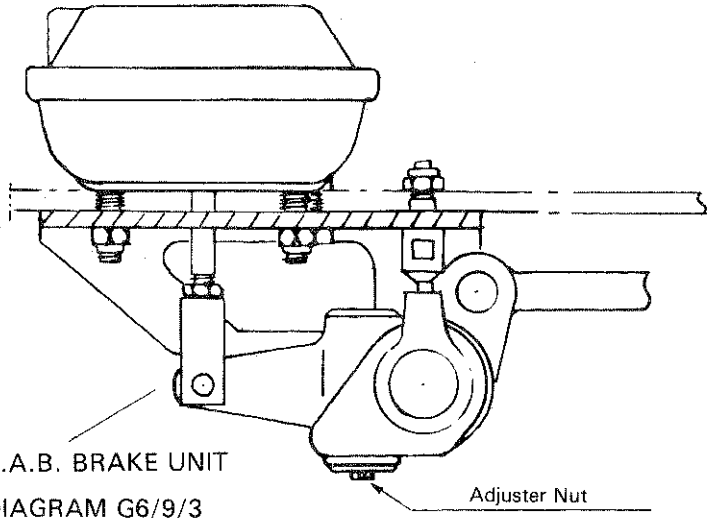
4. If, on a vehicle fitted with a brake regulator, the correct block/pad clearance is not obtained, the cause will be either incorrect setting of the gate or some mechanical defect.

5. In no circumstances should any hand adjustment be made to any other part of the brake gear.

G6/11. Gate setting (Distance 'A' on the diagram); this varies for different types of vehicles, typical settings being as follows:—

Vehicle	Nominal Gate Setting
Coaching Stock	
Cast iron or composition brake blocks acting on tread of wheels	$\frac{5}{8}$"
Air-Braked Wagons	
Covered, Open, Steel	$\frac{7}{32}$"
Cartic Wagons	$1\frac{1}{8}$"

For other types of vehicles refer to the maintenance instructions applicable.



S.A.B. BRAKE UNIT
DIAGRAM G6/9/3

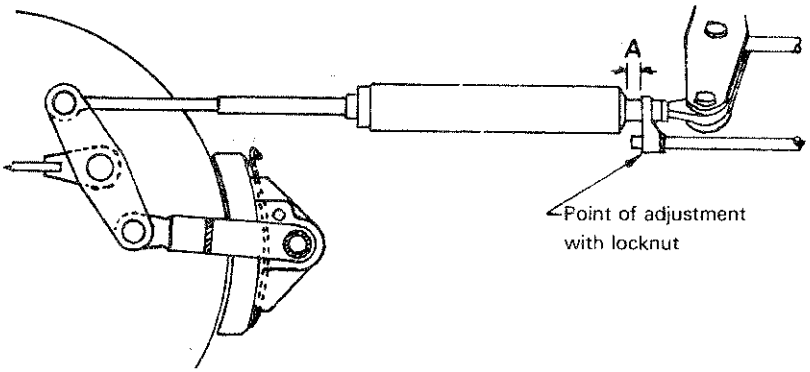


DIAGRAM G6/11 BRAKE REGULATOR (INDICATING GATE SETTING)

G6/12. Temporary bolting of Brake Components on freight stock.

1. Brake block hanger brackets may be temporarily secured by bolts having grover spring washers and split pins to enable the wagon to travel to a repair depot for them to be properly riveted.
   The wagon concerned must have 'For Repair' labels B.R. 11224 attached.

2. Brake Vee hangers and vacuum cylinder trunnion brackets which are normally riveted may be secured by bolts having grover spring washers and split pins and the wagon allowed to remain in service. They must be riveted when the wagon next undergoes Depot/Shop repairs.

7. Automatic Vacuum Brake

G7/1. The regulations for working the automatic vacuum brake, including the procedures for testing the brake, are contained in the General Appendix and Examiners must make themselves conversant with these instructions. The complete brake test on trains must be carried out when specified, otherwise the examiner should be present whenever possible at the time when the guard makes the brake continuity test. It is especially important that on partially fitted freight trains the automatic brake is operative on every braked vehicle in the fitted portion and such trains, when formed, should be given a complete brake test whenever circumstances permit.

If a defect is found, action should be taken to allow the train to proceed. If it is found necessary to blank off a brake cylinder or DA valve or otherwise isolate the automatic brake on a vehicle or part of a train, the guard must be informed and appropriate 'For Repair—Defective Brake' labels must be attached to the vehicle.

G7/2. Defects likely to occur in the vacuum brake system are :—

1. Leakage in the system at, for example, pipe joints, DA valves, cylinder release valves, piston rod glands, worn flexible hose pipes and branch pipes—missing or incorrectly seated joint washers, defective dummy plugs or bent dummy plug brackets.

2. Defective units—brake cylinders, DA valves, release valves—missing release cords, vacuum gauges in guards' vans, guards' brake application valves, passenger communication apparatus valves.

G7/3. Types of Vacuum Brake Cylinders and distinctive features.

1. 'Sliding Band' type cylinders, in which the piston seal consists of a rubber band or skirt. These cylinders can be recognised by the release valve which has no branch pipe, being situated on the side of the cylinder shell. When operated, the release valve allows air to pass directly from atmosphere to the space above the piston (upper chamber) and thus completely destroys the vacuum in the cylinder.

2. 'Rolling Ring' type cylinders, in which the piston seal consists of a

rubber ring about ½" diameter. There are 3 classes of this type of cylinder, as follows, the class being marked on the cylinder base.

C. Class. This is the older type of rolling ring cylinder, the ball valve which separates or connects the upper and lower chambers being contained in the release valve which is attached to the base of the cylinder.

E. Class. This is currently the more common type of rolling ring cylinder in use and has the ball valve incorporated in the piston head. For hand release purposes, the release valve, which is attached to the base of the cylinder, contains a flat valve which, when operated by the release cord, allows communication between the upper and lower chambers of the cylinder and thus equalisation of the vacuum, allowing the piston to fall to the released position.

F. Class. This type of rolling ring cylinder operates on the same principle as the E. class but has a separate reservoir or upper chamber. Thus the release valve, which is attached to the side of the cylinder, has two branch pipe connections, one from the vacuum train pipe or DA valve and the other to the vacuum reservoir.

3. Diaphragm Type Cylinders. These cylinders have a diaphragm instead of the conventional piston, but the release valve acts in the same manner as on rolling ring cylinders. Some wagons with disc brakes have small, short stroke, horizontally mounted diaphragm cylinders operating directly on the brake calipers. There may be a cylinder at each axle and thus a release cord at each end of the wagon.

G7/4. Brake cylinders can be defective due to :—

(a) Piston rod gland leaking allowing air to enter the cylinder and cause a brake application.

(b) Release valve or joint defective. Dependent on the nature of the defect this may cause a brake application or cause a failure of the brake to apply or remain applied.

(c) A defective piston seal which may cause failure of the brake to apply or remain applied or more usually causes the piston to seize in the cylinder in a 'brakes on' condition.

(d) Piston rod unscrewed from piston.

(a) and (b) may cause sufficient air leak into the brake pipe to make the brakes drag on adjacent vehicles.

In respect of item (d) if the piston rod of a sliding band type cylinder has become completely detached from the piston, no attempt must be made to re-assemble it since almost certainly the rubber buffing ring, which fits around the piston rod within the cylinder will have become displaced.

A defective brake cylinder must be first fully released by operating the release valve and then blanked off. NOTE : If a blanked off cylinder has not been fully released i.e. all vacuum in the cylinder destroyed—the brake may leak on. If, when releasing a cylinder, the piston does not come right down, the pin must be removed from the piston rod to free the brake gear. If the defect is known to be in the cylinder itself the blanking off can be achieved by inserting a blank rubber joint between the

release valve and the cylinder on rolling ring type cylinders, or between the flange of the branch pipe connection and the cylinder in the case of sliding band type cylinders.

If the defect is in the release valve or branch pipe or its location is not identified, the branch pipe should be disconnected and a plug inserted to seal the vacuum main pipe.

It is of no use to attempt to isolate a defective cylinder by blanking off the DA valve as this would still allow communication between the cylinder and the train pipe and air entering from the cylinder defect could cause brake dragging on other vehicles.

When a brake piston rod has been deliberately disconnected from the brake gear by removal of the pin, the cylinder should be blanked off and the piston rod should be secured by tying through the pinhole so that the cylinder cannot turn over. The brake shaft arm may also need tying up so that it cannot drop foul. Wire should be used for tying up, 12 SWG soft iron wire, Catalogue No. 12/46640 is suitable.

G7/5. Four Wheeled wagons fitted with two Brake Cylinders.

Some wagons have two brake cylinders so arranged that only one cylinder operates when the wagon is empty, but both when the wagon is loaded, thus giving the appropriate brake power. The changeover is achieved by a manually operated lever fitted at the solebar of the wagon. To denote this feature, an inverted solid triangle, generally white, is painted near the changeover lever.

Initially this lever simply actuated a cock which either opened or closed the passage to the 'loaded' cylinder, but should the lever be changed to the 'Empty' position and the cock thus closed whilst any vacuum still exists in the 'loaded' cylinder, any leakage into this cylinder, even though within allowable limits, would result in the piston eventually rising, possibly while en route, and applying the brakes on the wagon concerned and resulting in flats or scaly wheels.

A modification introduced to counter this, whereby the action of changing the lever to the 'Empty' position automatically admits air to the 'Top Side' of the isolated cylinder has now been carried out on many wagons and this is indicated by the addition of a solid semicircle to the top of the triangle marking.

On wagons not yet so modified it is essential that the vacuum be completely destroyed and brakes fully released by pulling release cords before operating the changeover lever from 'Loaded' to 'Empty' position. Such a problem does not, of course, arise when changing from 'Empty' to 'Loaded' position.

On some wagons, instead of having the manual changeover lever, the change from empty to loaded brake power (or vice versa) is obtained automatically through special linkage incorporated in the spring suspension.

G7/6. Bogie Vehicles.

Most bogie vehicles fitted with vacuum brakes have two brake cylinders, i.e. each cylinder operates the brake on one bogie. When releasing the vehicle brake by hand the release valves must be operated on both cylinders.

G7/7. Release Valves.

Sliding Band Cylinders. A release valve which is not seating correctly

will admit air into the top side of the brake cylinder and cause the cylinder to be inoperative. This air can also pass the piston seal and provide a continuous leak into the brake pipe and thus cause the brakes to drag on the train.

Rolling Ring Cylinders. A non-return valve is provided to give communication between the top and bottom sides of the piston. The Class E and Class F cylinders have this valve fitted in the piston. Earlier designs have the non-return valve incorporated in the release valve. It is necessary for the correct type of release valve to be fitted, e.g. Class E release valves (these have the letter 'E' cast on the side of the valve body) must be fitted only to Class E cylinders. (The cylinder classification is cast on the cylinder base). If the incorrect type of release valve is fitted, the cylinder may be inoperative.

The release valve, if not seating correctly will cause the cylinder to become inoperative but will not admit air into the brake system.

Brake release valves are usually operated from either side of the vehicle by means of a cord attached to the release valve and the solebar. The locations of the release cords are denoted by small white or black stars on the side or solebar of the vehicle. The cords must be sufficiently loose to avoid tension on the valve lever when the cylinder swings on its trunnions during a brake application. They must not be so long that there is risk of entanglement. Allowance for shrinkage when wet is necessary with cords made from natural fibres. Cords of synthetic material are not subject to shrinkage.

Always make sure that release cords are in position and in good condition.

To ensure complete destruction of the vacuum in a rolling ring type cylinder when the release valve is operated, one of the vehicle hosepipes should be left off the dummy coupling until release is complete. Should the vehicle be fitted with a D.A. valve, however, this precaution would not be necessary.

G7/8. Direct Admission (D.A.) Valves.

These are fitted to most coaching and some freight stock vehicles. Their purpose is to reduce the time required for a brake application made by the driver to progress the length of the train and thus reduce the time lag in brake application which occurs between vehicles at the front and those at the rear of a train.

The principle of operation is that air admitted into the brake pipe by the driver's brake valve will be used to operate the D.A. valves only and not be used to fill the brake cylinders. Air to the brake cylinders is admitted directly from atmosphere through the D.A. valves which are open in proportion to the fall in vacuum in the brake pipe.

NOTE: that unless the D.A. valve is defective air cannot pass from the brake pipe into the cylinder but when the driver releases the brake air is drawn from the cylinder into the brake pipe through a non return valve in the D.A. valve.

Direct Admission (D.A.) Valves can be defective:—

(a) by sticking in the open position allowing air to enter the train pipe continuously.

(b) by sticking in the closed position when air cannot pass to the brake cylinder and the brake will not apply.

In all cases of defect the D.A. valve must be blanked off. If it is known positively that there is no defect to the cylinder this need not be given attention but

if there is any doubt blank off the cylinder as well as the D.A. valve.

The B.R. type D.A. valve may be fitted with a cast type dome cover or one pressed from sheet metal; with the latter type there is also a coned brass washer. To blank off the D.A. valve, the split pin and wing nut should be removed, followed by the dome cover, coned washer, if fitted, and filter. A lightly oiled card should then be placed over the valve ports, to act as a joint or gasket.

If the dome cover is of the cast type, this should be placed, upside down over the card, the filter, upside down, placed inside this and the whole assembly tightly secured by the wing nut and split pin.

If the cover is of the pressed metal type the coned washer, with the larger diameter downwards, should be placed first over the card, followed by the cover and filter, upside down and the assembly tightly secured by the wing nut and split pin.

On freight stock the B.R. type D.A. valve is being fitted with a plastic choke plate fitted directly over the valve ports, in order to obtain a smoother development of braking forces on the vehicles and when fitted with such a choke the gauze filter is dispensed with. When blanking off a D.A. valve fitted with a plastic choke plate this should be replaced in the same order as the gauze filter would have been. D.A. valves fitted with choke plates have their dome covers painted blue.

The G.W.R. type D.A. valve, fitted on certain Western Regionally designed vehicles, operates in the same manner as the B.R. type, but to blank off these valves, the domed cap and filter should be lifted to gain access to the air entry hole which can then be plugged with a $\frac{3}{4}$" cork.

G7/9. Hose Pipes.

The flexible coupling hoses at the ends of vehicles must be set so that the coupling head is at the correct angle to engage properly with the coupling head of the adjacent vehicle. The hose clip must be tight so that the hose will not be pulled off the pipe and leakage will not occur.

Hose pipes with visual signs of defect should be changed and it must be ensured that the joint washer is in position in the coupling head and in good order.

Pins and chains in good condition must be fitted to the coupling heads of the flexible hosepipes on all coaching stock vehicles and on freight vehicles which have the flexible hoses joined to a high stand pipe.

G7/10. Colour Code.

The vacuum brake pipe ends and 'Swan necks' on vehicles are colour code painted as follows:—

RED — Fitted vehicles i.e. with a brake operated by the automatic brake system.

WHITE — Piped only vehicles i.e. not fitted with a brake operated by the automatic brake system but with a 'Through' pipe for the purpose of coupling other vehicles.

G7/11. Passenger Communication Apparatus.

In all passenger vehicles there is a valve connected to the brake pipe which can be operated from inside the vehicle to apply the brake on the train. This valve is

operated by pulling on a chain or lever in accordance with instructions exhibited in the vehicle.

When testing a train for leakage in the brake system, make sure that all the passenger communication apparatus valves are fully closed.

G7/12. Guards' brake Application Valve.

This valve is provided in fitted or piped brake vans to enable the guard to make a brake application on the train if necessary in an emergency and when the brake van is the end vehicle, to test the continuity of the brake.

G7/13. Vacuum Gauge.

This is fitted in the Guard's compartment adjacent to the Guard's brake valve and connected to the brake pipe. When examining brake vans, check that this gauge is not damaged and check its reading with that of the gauge on the test cock whenever a brake test is being carried out.

G7/14. Two-Pipe Quick Release Vacuum Brake System fitted to Diesel Multiple Units.

Under this system the vehicles are fitted with a brake pipe and a reservoir pipe. The coupling heads of the flexible hoses on the reservoir pipe are the opposite hand from the standard couplings on the brake pipe. If called upon to replace a hose make sure that the correct type is fitted.

The colour code for the vacuum pipe ends is :—

RED — Brake pipe.

BLUE — Reservoir pipe.

Each vehicle has a vacuum reservoir to which the reservoir pipe is connected.

When the driver's brake valve is in the 'Brake Off' position the vacuum is maintained at 21" in the brake pipe and up to 30" in the reservoir pipe and reservoirs. This high vacuum in the reservoir system is maintained during a brake application and when the driver's brake valve is moved to 'Brake Off' the brake pipe is connected to the high vacuum in the reservoir system and a rapid release of the brake occurs until 21" vacuum is obtained in the brake pipe. A 'Feed Valve' in the system prevents the brake pipe vacuum rising above 21".

An Automatic Isolating Valve closes to isolate the reservoirs when the vacuum in the release side drops to 19". The 'locking up' of this degree of vacuum in the reservoirs contributes to the speed with which the whole system can be recharged.

D.M.U. vehicles can have coupled to them other vehicles with standard single-pipe vacuum brake system and (within the capacity limit of the D.M.U. power cars) the vacuum brake will operate satisfactorily although the brakes will take longer to release.

'Dead' railcars can also be coupled in a locomotive hauled train and the vacuum brake will operate satisfactorily. If a power car is included, the D.S.D. (driver's safety device) and A.W.S. (automatic warning signal) apparatus must be isolated.

Defects arising to brake cylinders, release valves, D.A. valves, hoses, should be dealt with in the same manner as on other stock.

G7/15. Accelerator—Freight D.A.—Inshot (A.F.I.) System.

This is a vacuum brake system, primarily for freight vehicles, designed to permit rapid and heavy braking of freight trains without excessive shocks.

Under this system each wagon is fitted with an accelerator valve, mounted on the brake pipe, which opens only during emergency braking to admit air into the train pipe.

Each brake cylinder is fitted with a combined D.A. valve and release valve which is connected by a flexible pipe to an inshot chamber (a small reservoir with an air inlet orifice). Air inlet to the cylinder is by way of this orifice and chamber.

Some privately owned wagons and a small number of B.R. wagons are fitted with this system and are identified by the A.F.I. plate or markings on the solebars.

Features to note are:—

A leaking accelerator valve can be blanked off with a stout rubber blank at the flange joint with the brake pipe. (The accelerator valve has been removed from some wagons.)

A defective cylinder release valve or D.A. valve should be dealt with by disconnecting the branch pipe to the brake pipe and plugging. Ensure that the cylinder is fully released. The release of the cylinder takes longer than would be the case with cylinders having a standard release valve.

G7/16. Dual Brakes.

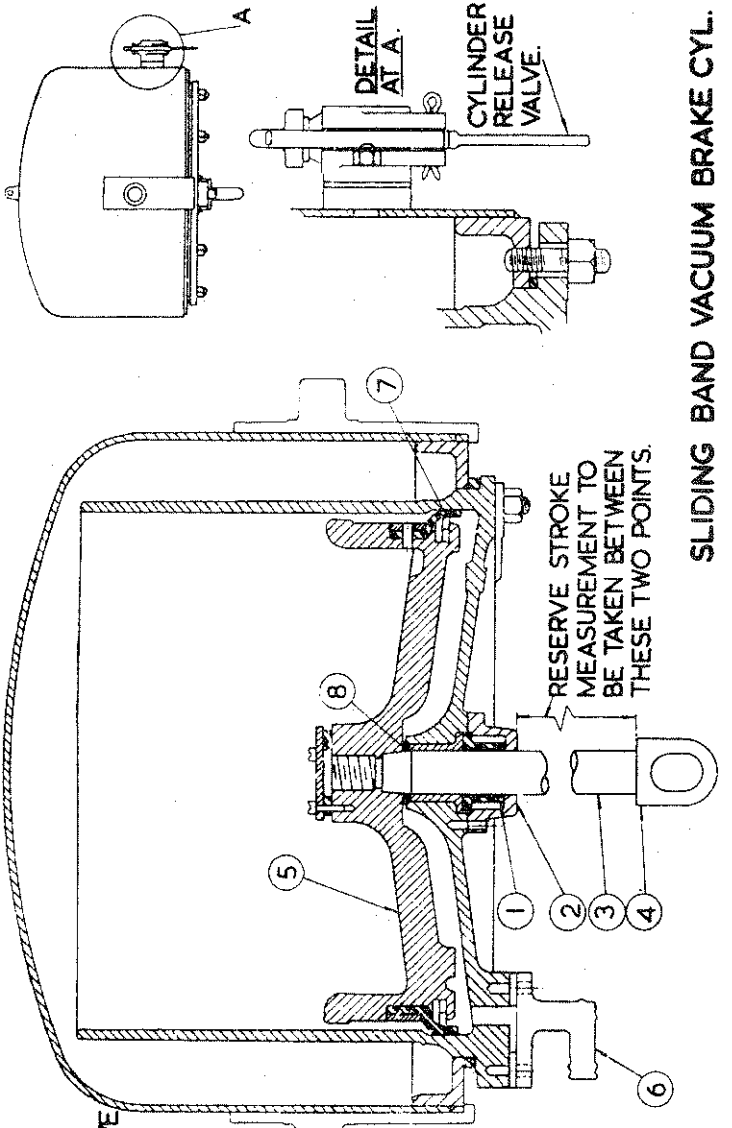
Some vehicles—both freight and coaching stock—are fitted with both vacuum and air brakes. It is important to ensure that the brake system not in use is fully released and all vacuum or air pressure destroyed to avoid dragging brakes.

G7/17. Vacuum 'Piped Only' Vehicles.

Certain vehicles although not fitted with vacuum brake equipment have 'through' vacuum pipes to effect continuity should the vehicle be interposed between vacuum brake fitted vehicles; on such vehicles the brake pipe end or 'Swan Neck' is painted white. Certain brake vans are also piped only, but these must, in addition, be fitted with a guards application valve and vacuum gauge.

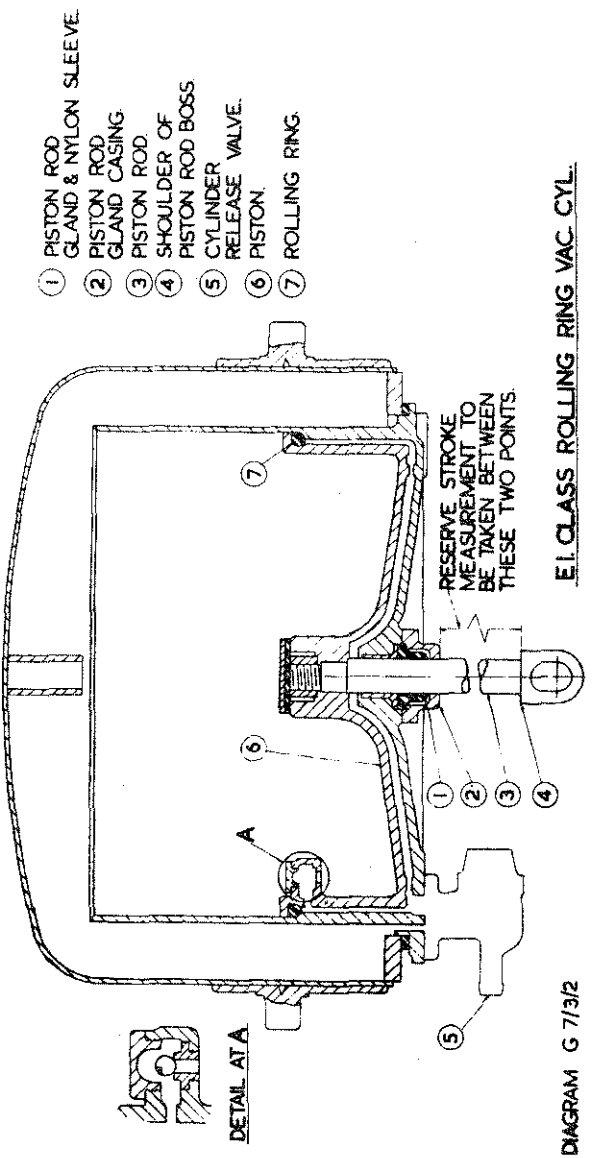
G7/18. Vacuum Brake Overhaul.

The periodicity for the complete overhaul of the vacuum brake equipment of freight stock is 3 years for B.R. owned wagons and $3\frac{1}{2}$ years for privately owned wagons. At alternate brake overhauls the train pipe should be dismantled, cleaned and separately tested.



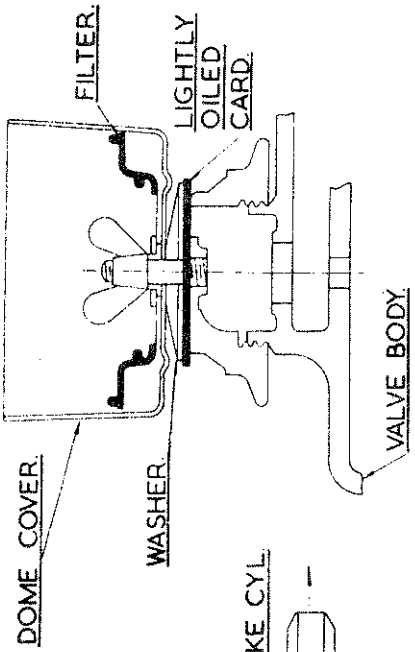
SLIDING BAND VACUUM BRAKE CYL.

DIAGRAM G7/3/1

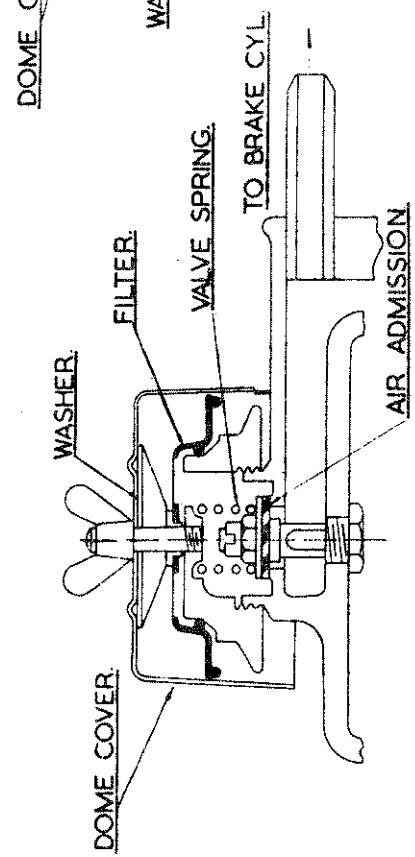


E.I. CLASS ROLLING RING VAC. CYL.

DIAGRAM G 7/3/2



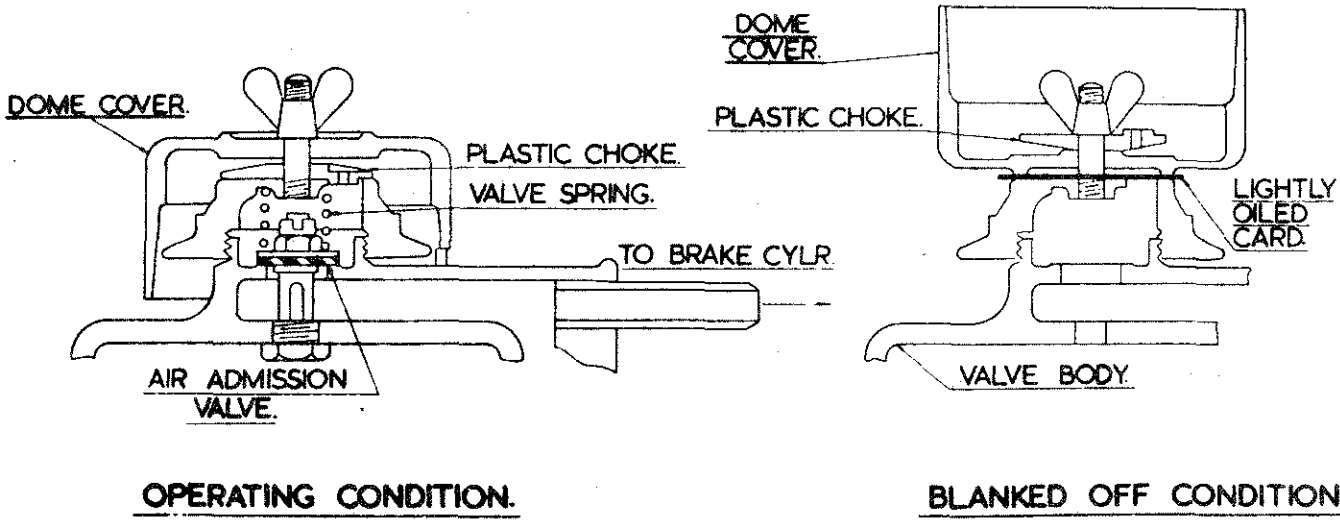
BLANKED OFF CONDITION



OPERATING CONDITION

DETAIL – B.R. TYPE D.A. VALVE.-COACHING STOCK

DIAGRAM. G 7/8.



OPERATING CONDITION.

BLANKED OFF CONDITION.

DIAGRAM. G7/8.

DETAIL-B.R. TYPE D.A. VALVE.-FREIGHT STOCK

8. Automatic Air Brake

G8/1. Regulations.

The regulations for working the automatic air brake, including the procedures for testing the brake, are contained in the General Appendix and examiners must make themselves conversant with these instructions. The complete brake test on trains must be carried out when specified and the examiner should be present whenever possible at the time when the guard makes the brake continuity test. It is especially important that on partially fitted freight trains the automatic brake is operative on every vehicle in the fitted portion and such trains, when formed, should be given a complete brake test whenever circumstances permit.

If a defect is found, action should be taken if possible to allow the whole train to proceed safely, either by correcting the defect or isolating the brake on the vehicle or vehicles concerned. Vehicles found with the brake defective should be detached from the train only when it proves impossible to give such attention as will enable the whole train to proceed.

Where the brake has been made inoperative on a vehicle or part of a train the Guard of the train, the Inspector or Station Manager, must be informed so that it can be decided whether the train is fit to remain in service in accordance with the regulations in the General Appendix regarding the permitted number and the position in the train of vehicles with brakes inoperative. The isolation of the main reservoir pipe on the whole or part of a train must also be specially reported.

In all cases when the automatic brake has been isolated on a vehicle or part of a train, the appropriate 'For Repair—Defective Brake' labels must be attached to the vehicles concerned, whether they remain formed in the train or are detached.

G8/2. The standard B.R. automatic air brake operates on a 'two pipe' system under which each vehicle is fitted with a Brake pipe and a Main Reservoir Pipe. The brake pipe is normally charged with air compressed to 72.5 p.s.i. and in this condition the brakes are held in the 'Off' position. A brake application is made by reducing the pressure in the brake pipe. This causes air pressure to rise in the brake cylinders by a feed of air from the auxiliary reservoir fitted to each vehicle. This auxiliary reservoir is maintained at a pressure of 85 to 105 p.s.i. by the Main Reservoir Pipe.

The brake is released by recharging the Brake pipe to 72.5 p.s.i.

If the Main Reservoir Pipe is isolated on one or more vehicles, the brakes on such vehicles operate on a single pipe system and in this case, the auxiliary reservoirs are charged with air from, and to the same maximum pressure as, the Brake pipe.

G8/3. Defects likely to occur in the air brake system are :—

(1) Leakage in the system at, for example, pipe joints, flexible hoses or coupling head joint washers.

(2) Cocks or valves not in the fully closed or fully open position (end cocks, guard's valve, distributor or main reservoir pipe isolating cocks).

(3) Incorrect coupling of pipes.

(4) Defective components (the principal components are described in Section G8/4).

G8/4. Components and their function.

1. Distributors.

The distributor controls the application and the release of the air brake on the vehicle in response to changes in the pressure in the brake pipe, brought about normally by operation of the driver's brake valve.

There is generally one distributor per vehicle but in some applications (e.g. articulated sets) a distributor may control the brake on one bogie only.

There are various manufacturer's types of distributors in use on B.R. and Continental wagons, for example :—

Westinghouse
Davies & Metcalfe
Laycock Knorr
Charmilles

The characteristics and settings of distributors are matched to vehicle type requirements and for this reason, distributors are not generally interchangeable.

The time settings of the distributor determine the time taken for a brake application to develop on a vehicle and also the time for a brake application to be fully released.

These timings are important for smooth braking of trains and are longer on vehicles running at normal freight train speeds than on coaching and fast freight vehicles running at over 60 m.p.h.

Coaching and certain freight vehicles have distributors which are set for 'Passenger' timings. Freight vehicles which are not required to run at more than 60 m.p.h. have distributors set for 'Goods' timings. Distributors which can be set manually to operate at either 'Passenger' or 'Goods' timings are fitted to wagons which may be required to run at more than 60 m.p.h.

The principal functions of the distributor are :—

(i) To control the feed of air from the auxiliary reservoir to the brake cylinders during brake application.

(ii) To control the exhaust of air from the brake cylinders during brake release.

(iii) To charge the auxiliary reservoir with air from the brake pipe in the event of there being no higher pressure in the main reservoir pipe (i.e. single pipe system).

The distributor is fitted with an isolating cock controlled by a handle which must be in the vertical position for normal operation and the horizontal postition when the vehicle brake is to be isolated. It has a hand operated release valve which can be used to manually release the air brake on the vehicle and which must always be operated when the distributor is isolated, to ensure that the brakes are not locked on.

2. Control Reservoir.

This is a chamber which becomes charged with air from the brake pipe during brake release but is isolated from the brake pipe during brake application. It is the difference in pressure between the control reservoir and the brake pipe (when the latter is reduced during the brake application) which causes the distributor to feed air to the brake cylinders.

When the brake is released, the locomotive must create in the brake pipe a pressure at least equal to that which was locked in the control reservoir at the time of the brake application or the brakes will not come fully off.

'Overcharge' of the control reservoir is a condition resulting from a brake application being made at a time when the brake pipe pressure (and thus control reservoir pressure) was higher than is achieved during subsequent brake release, (e.g. at a change of locomotive).

The control reservoir may be formed as an integral part of the distributor casing (e.g. Westinghouse P4 type) or as a separate chamber connected to the distributor by pipework (e.g. Davies & Metcalfe).

Some vehicles have an additional valve fitted to the distributor which is known as a 'dump valve', the function of which is to drop the pressure in the control reservoir by 10 p.s.i. when the brake pipe pressure is reduced to 10 p.s.i. or below; thus avoiding 'overcharge' difficulties at times of full brake application or locomotive change.

3. Triple Valves.

Many Continental air braked wagons and some early air braked B.R. wagons are fitted with triple valves instead of distributors; many electric coaching stock vehicles, as described in Section G8/7 are also fitted with these valves, which although of different construction perform the same basic functions as do distributors, but operate on the 'Single Pipe' system.

To isolate the brakes on a vehicle fitted with a triple valve, the handle of the isolating cock, fitted in the air supply pipe to the valve, should be turned to the closed position. When isolated the vehicle can be used as a 'through piped' vehicle but it must be ensured that all air pressure in the brake cylinders is destroyed by operating the brake release valve, the location of the operating cord being indicated by a black or white star painted on the side of the vehicle.

4. Goods/Passenger Change over gear (where fitted).

This is the gear for operating the changeover of the distributor setting. This operating lever, which has a ball top for identification, is situated below each solebar, in front of a plate marked G and P.

5. Auxiliary reservoir.

This is fitted to each vehicle and is connected to the main reservoir pipe so that it is normally charged with air to a pressure of 85 to 105 p.s.i. from the main reservoir on the locomotive. If the main reservoir pipe is inoperative and the vehicle working 'single pipe' the supply of air to the auxiliary reservoir is provided from the brake pipe through the distributor and in this case the pressure in the auxiliary reservoir will not exceed the maximum provided in the brake pipe.

6. Brake Cylinder.

The brake cylinder piston applies pressure to the brake blocks or pads through the brake rigging when the cylinder is fed with air from the auxiliary reservoir under the control of the distributor.

The brake is released when the air in the cylinder is allowed to escape through a port in the distributor. A spring inside the brake cylinder returns the piston to the brakes off position.

7. Strainer, Check valve and Choke units.

These are fitted in the branch pipe connecting the main reservoir pipe to the auxiliary reservoir. The Strainer is provided to prevent foreign matter being carried into the brake system.

The Check Valve is a non-return valve provided to prevent air in the auxiliary reservoir passing into the main reservoir pipe if the latter is at a lower pressure.

The Choke is an orifice of a size which limits the rate at which air from the Main Reservoir Pipe can pass into the auxiliary reservoir. The purpose of this choke is to allow the air supply available in the main reservoir pipe to be distributed evenly to all the auxiliary reservoirs in a train so that the air pressures in the auxiliary reservoirs are the same on all vehicles.

8. Variable load and Empty/Loaded Devices.

The purpose of these units is to adjust the pressure exerted on the brake blocks or pads in proportion to the load on the vehicle so that while maximum required braking power can be available on the fully loaded vehicle, the braking power is reduced for a partially loaded or empty vehicle so that damage to wheels and tyres is avoided. There are both manually operated and automatically operated units. The manually operated type is usually found on Ferry Wagons. It has a two position lever at the solebar marked Empty—Loaded (or Vide-Charge on Continental wagons).

The automatic type is operated by changes in the vehicle spring deflection with variation in load.

Some units work on the principle of adjusting the pressure in the air brake cylinder to suit the load and others by altering the leverage of the mechanical linkage of the brake gear.

9. Main Reservoir Pipe Isolating Cock.

This cock is fitted in the branch pipe between the main reservoir pipe and the auxiliary reservoir and is open when the handle is in line with the branch pipe and closed when the handle is at right angles to the pipe. The location of this cock is indicated by the letters I.C.R. painted on the solebar or side of the vehicle.

The cock must be closed when the distributor isolating cock is closed to isolate the air brake on a vehicle. (The release valve must also be operated.)

10. Brake Cylinder Pressure Test Points.

These may be in the form of Schrader check valves or actual gauges or may be removable plugs to allow attachment of gauges to enable brake cylinder pressure to be checked when required.

11. End Coupling Cocks.

These are fitted to the brake pipe and main reservoir pipe at the vehicle headstocks and are the means for closing the pipes at the ends of trains or intermediately in an emergency. In normal train operation all coupling cocks must be open except those at the leading end of the locomotive (or of the leading vehicle of a multiple unit train) and the trailing end of the rear vehicle (or in the case of a partly fitted train, of the rear vehicle of the fitted portion of the train).

The end cocks are painted different colours for identification :—

Brake Pipe	— Red
Main Reservoir Pipe	— Yellow

Through Brake Pipe on
Air pipe only vehicles — White

12. Flexible Hosepipes and Coupling Heads.

These are used to connect the pipes of adjacent vehicles so that the brake shall be continuous throughout the train, an airtight joint being effected by a rubber sealing washer housed in each coupling head. For identification purposes each brake pipe coupling head is painted red, while each main reservoir pipe coupling head is painted yellow, but the latter is also fitted with a non-return valve (star valve), visible in the open end, the purpose of which is to retain the air pressure in the main reservoir pipe and thus avoid loss of air from the locomotive main reservoir in the event of the pipes accidentally parting; the two valves are held off their seats when two coupling heads are engaged.

The brake pipe coupling head contains no such valve, since it is essential that, in the event of brake pipe hoses becoming uncoupled, air can escape and thus cause the brakes to be applied.

13. Duplex Pressure Gauge.

The gauge has two pointers: a red one indicating brake pipe pressure and a yellow one indicating main reservoir pipe pressure.

In some cases two separate gauges may be provided instead of one duplex gauge.

14. Coupling Support Brackets.

These are provided at each vehicle headstock and the couplings of flexible hosepipes not in use for coupling to another vehicle must be secured on to these brackets.

15. Guards Brake Application Valve.

This valve is provided in fitted or piped brake vans to enable the guard to make a brake application on the train if necessary, in an emergency and when the brake van is the end vehicle, to test the continuity of the brake.

16. Passenger communication apparatus.

In all passenger vehicles there is a valve connected to the brake pipe which can be operated from inside the vehicle to apply the brake on the train. This valve is operated by pulling on a chain in accordance with the instructions exhibited in the vehicle.

When testing a train for leakage in the brake system, make sure that all the passenger communication apparatus valves are fully closed.

G8/5. Dual Brakes.

Some vehicles—both coaching and freight stock—are fitted with both vacuum and air brakes. It is important to ensure that the brake system not in use is fully released and all vacuum or air pressure destroyed to avoid dragging brakes.

G8/6. Air Piped Only Vehicles.

Certain vehicles, although not fitted with air brake equipment, have 'through' air pipes to effect continuity should the vehicle be interposed between air brake fitted vehicles; on such vehicles the brake pipe end cock is painted white. Certain brake vans are also piped only but these must, in addition, be fitted with a guards application valve and air pressure gauges.

G8/7. Air Brakes on Electric and Diesel-Electric Multiple Units.

1. Automatic Air Brake.

These units are fitted with triple valves, the automatic air brake operating on the 'Single Pipe' system. The air supply is obtained from compressors, fitted on all power units, charging the main reservoir and main reservoir pipe. In turn the brake pipe is charged through a regulating feed valve via the driver's brake valve and the auxiliary reservoirs via the triple valves. Operation of the brake is similar in principle to the 'one pipe' system on locomotive hauled stock.

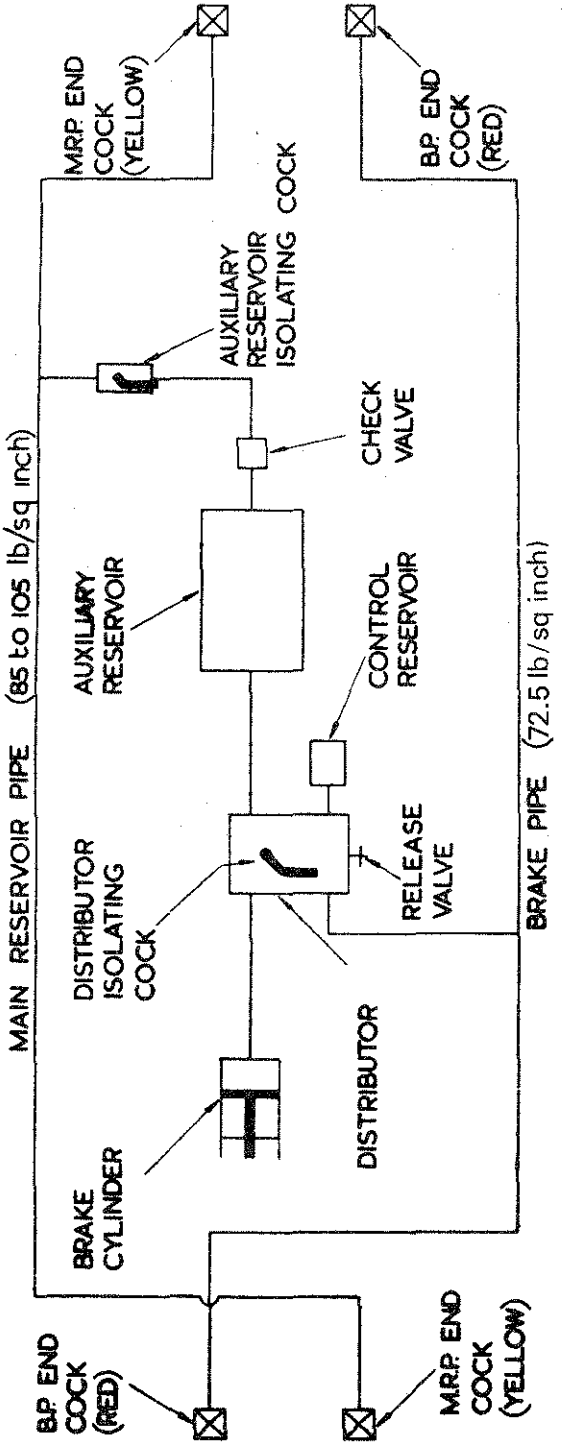
2. Electro-Pneumatic Brake.

This Brake system is also fitted to most of the above units, being superimposed on the automatic brake system and is always used when fitted since it gives a simultaneous control over all vehicles in the train. Each vehicle is fitted with an electro-pneumatic brake chest which, in response to electric impulses initiated by the Driver through a special combined electro-pneumatic and automatic brake valve, allows air to pass from the main reservoir pipe, via the brake chest, to the brake cylinders. Because of this feed being directly from the main reservoir pipe no drop in pressure will be indicated on the brake pipe pressure gauge on brake application.

In emergency, both electro-pneumatic and automatic air brake systems can be used simultaneously or, if the electro-pneumatic brake should be defective, the automatic brake system can be used alone. In such cases brake pipe pressure reductions would be registered.

G8/8. Air Brake Overhaul.

The periodicity for the complete overhaul of the air brake equipment of freight stock is 3 years for B.R. owned wagons and 3½ years for privately owned wagons. This periodicity may, however, be amended following technical investigations, in which case revised instructions will be issued.



SIMPLE DIAGRAM OF TWO PIPE AIR BRAKE SYSTEM ON ROLLING STOCK

DIAGRAM G.8.

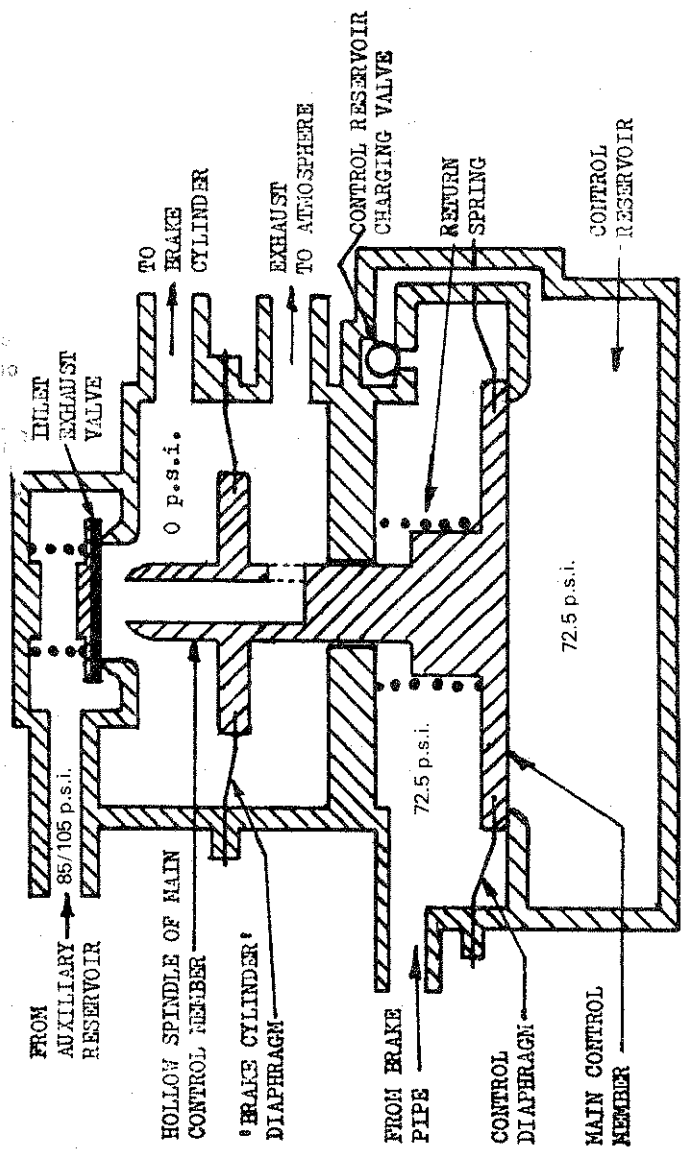


DIAGRAM SHOWING PRINCIPLE OF AIR BRAKE DISTRIBUTOR
(WITH INTEGRAL CONTROL RESERVOIR)
DIAGRAM G8/4/1 & G8/4/2

9. Axleboxes and Axleguards

G9/1. Plain bearing Axleboxes.

(1) Standard axleboxes with lubricator pads.

(a) Divided type consisting of top and bottom sections bolted together, the oil well being an integral part of the bottom.

(b) Shock absorber type, also of divided construction and incorporating neoprene resilient pads to prevent metal to metal contact between axlebox and axle journal at times of shock, e.g. in a rough shunt.

(c) Open fronted with the oil well formed as an integral part of the box. A cast iron slipper is fitted between the bearing and the axlebox top and must be removed to provide sufficient clearance to withdraw the bearing from the axlebox.

(d) Open fronted with a separate oil tray which can be withdrawn from the axlebox, without the use of tools, for examination and cleaning. A slipper is fitted in this axle box.

(e) 'Kooler' type open fronted with separate oil tray but not fitted with bearing slipper. Instead the back of the axlebox has an enlarged opening which permits the axlebox to be lifted sufficiently to give enough clearance for the bearing to be withdrawn. The opening is sealed by a loose 'Banana' plate which hangs from a support situated on each side of the back opening. Before the bearing can be removed this plate must be detached, but must be replaced in the correct position after replacement of the bearing.

(2) Hybox and Athermos Axleboxes—These axleboxes have no lubricator pads, lubrication being achieved by a splash feed created by a 'flinger arm' attached to the end of the journal. The boxes are sealed against oil leakage and ingress of dirt etc. and the filler hole is closed by a screw plug.

G9/2. Roller bearing Axleboxes.

These generally consist of two roller races assembled in a shell housing which may be in the form of a composite axlebox unit or may consist of a bearing unit with horseshoe adaptor saddle. These axleboxes are grease packed, replenishment in the case of coaching stock being required only at shopping periods and in the case of freight stock whenever wheels/wheel tyres are turned.

G9/3. Examination of Axleboxes.

1. External condition.

Axleboxes must be checked for damage, wear at axleguard grooves, oil leakage, fracture, looseness of Tee bolts or front securing bolts as applicable. Minor damage or blemishes to the axlebox castings can be accepted provided they do not

interfere with the correct function of the axlebox in respect of retention of oil, prevention of entry of foreign matter and correct location of spring buckle and axleguard.

When checking for indication of overheating the back of the hand should be applied to the top of the axlebox. If overheating is found or suspected the axlebox must be opened up for inspection. If very hot this must be done with caution because of risk of fire and it may be advisable to give time for cooling before opening.

2. Internal Examination.

Whenever an axlebox is opened it must be checked for internal cleanliness, condition of journal, bearing, slipper and bearing and slipper retaining lugs. The condition of the lubricating pad must also be checked.

G9/4. Oiling of Axleboxes.

1. General.

It is important that a policy of cleanliness be observed when dealing with the interior of axleboxes and care must be take to avoid ingress of dirt or water.

Particular care must also be taken in the storage of oil to prevent such contamination.

Prior to adding new oil during axlebox oiling operations, care must be taken to check for the presence of water in the box and for any present to be removed by means of a syphon pump and the oil well then fully charged with the correct grade of axle oil.

2. Periodicity.

(a) Coaching Stock. Weekly

(b) Freight Stock.

Brake vans	Monthly
Wagons having Hybox or Athermos boxes	6 Monthly
Specially constructed wagons	Monthly and before each loaded journey
All other wagons	2 Monthly

3. Procedure.

(a) Open Fronted Axleboxes.

Check that the lubricator pad is correctly positioned and in true contact with the journal and that pad feeders are correctly located in the oil well or tray. In the case of the latter it may be necessary for the tray to be partly withdrawn to ensure this. Sufficient new oil should be added to fill the well or tray.

(b) Divided Type Axleboxes.

The tee bolts securing top and bottom sections of the axlebox must be properly tightened as looseness could cause the lubricator to loose contact with the journal. Sufficient new oil should be added to fill the well.

(c) Hybox and Athermos Axleboxes.

Remove filler plug and check that the oil is level with the bottom of the filler hole. Replenish as necessary with new oil and replace the filler plug.

Ensure that the breather hole in the side of the box is not blocked by dirt. Whether additional oil has been necessary or not the wagon should be endorsed as having been oiled.

If there is evidence of oil leaking from the seal at the back of the axlebox (i.e. oil traces on the wheel centre) the wagon must be labelled for attention after making sure that there has been no heating of the axlebox due to shortage of oil.

4. Endorsement.

When oiling of the vehicle is completed, the date and depot number must be chalked on both sides of the vehicle as follows :—

Coaching Stock—Bogied —in the centre of the solebar of the left hand bogie.

—Non-bogied—at the extreme left hand end of the solebar.

Freight Stock —in the appropriate space of the C.M. & E.E. panel. e.g. D.O. 29/7/72 0000

G9/5. Pad Examination.

1. General.

It is important that a policy of cleanliness be observed when dealing with lubricator pads and the interior of axleboxes; particular care must be taken in the storage of lubricator pads to prevent contamination by dirt, grit, sand etc.

Replacement or new pads must have been soaked in oil for a period of 48 hours and allowed to drain for between 24—48 hours. It is important to ensure that the correct type and size of lubricator pad is fitted.

2. Periodicity.

Coaching Stock	— 6 monthly
Coaching Stock under special maintenance	— 3 monthly
Freight Stock	— 12 monthly

N.B. Gunpowder and other vehicles used for the conveyance of explosives must be given pad examination prior to each loaded journey.

3. Procedure.

1. Open cover of open fronted axlebox or slacken tee bolts and lower bottom section of divided type axlebox and remove lubricator for examination for any of the following defects :—

(a) Glazed or worn nap or foreign matter embedded in nap. Should traces of white metal be found in the nap, arrangements should be made for the bearing to be removed for examination.

(b) Feeders rotted or missing.

(c) Distorted, weak or broken springs.

2. Remove all old oil from the axlebox or oil tray and thoroughly clean the well.

3. Examine journal, as far as possible, for damage or discolouration.

4. Refill with fresh oil.

5. Before replacing pad, squeeze out feeders to remove any trace of water and rub new oil into the nap of the pad.

6. Insert pad into box or tray ensuring that feeders are correctly located and ensure that pad is in true contact with the journal.

7. In the case of divided type boxes reassemble bottom section to top section and thoroughly tighten tee bolts which must be fitted with ¾" grover spring washer and 1" deep nut.
If the bottom split pin is not in close engagement with the nut, ¾" flat washers must be added to the top of the nut to prevent it slackening back.
Refill with fresh oil.

4. Endorsement.

When pad examination of the vehicle is completed, the date and depot number should be endorsed, in 1" white painted figures at both sides of the vehicle, after deletion of the old endorsement.

Coaching Stock — Bogied — in the centre of the solebar of the right hand bogie.
— Non-bogied — at the extreme right hand end of the solebar.

Freight Stock — in the appropriate space of the C.M. & E.E. panel e.g. P.E. 19/7/72 0000

G9/6. Waste Packing.

The use of waste packing in axleboxes is only permitted in cases of emergency to enable a wagon to be moved to the nearest repair point. The waste, which must have been adequately soaked and drained must be stranded, ends turned in and rolled and then well packed with a rammer up to the journal over its full length.

G9/7. Axleguards and Bridles of 4 and 6 Wheeled Vehicles.

1. Non-Passenger Carrying Coaching Stock and Fish Vans having shoe or eyebolt suspension should be withdrawn for repairs if the total longitudinal clearance between axleguard and axlebox exceeds ½".

2. Wagons fitted with shoe or eyebolt suspension and plain bearing axleboxes should be withdrawn for repairs if the total longitudinal clearance between axleguard and axlebox exceeds ½".

3. On wagons with roller bearings and/or types of suspension other than shoe or eyebolt there are many variations in the designed

axleguard/axlebox clearances and it will be necessary to obtain details from the relevant Maintenance Manual or other appropriate source.

4. The clearance between axleguard bridles and the bottom of the axleboxes must not be less than $\frac{1}{2}$" when the vehicle is empty.

5. 'Through' tie bars (stretching from one axleguard to the other along the vehicle) should only be fitted to vehicles having push type brakes.

6. It is permissible for axleguards to be secured with bolts provided with grover spring washers and split pins to enable the vehicle to travel to a repair depot for them to be properly secured. The vehicle concerned must have 'For Repair' labels B.R. 11224 attached. Such bolts should not be confused with Huck Bolts or Friction Grip Bolts which are now permitted alternatives for securing axleguards.

10. Body and body fittings, Freight Stock, including Containers

G10/1. Body Sides and Ends.

Stanchions must not be seriously distorted, nor fractured and securing rivets, bolts and welds must be intact.

Side and end sheeting must be sound and properly secured.

The inside surfaces of open and covered wagons and containers must be smooth and free from projections which could cause damage to cargo (for example protruding bolts). Insulation, where provided, must not be damaged.

Capping irons on open wagons must be intact and secured.

G10/2. Roofs.

Earlier types of covered wagons usually have timber roofs covered with roofing canvas or other waterproof material which requires periodic dressing. Wagons with the covering torn or otherwise defective allowing the penetration of water must be labelled for repairs. When roof attention is given in Shops, the date is painted on one end of the wagon at cant rail level.

Later wagons have metal sheeted roofs.

G10/3. Doors.

(a) All doors are required to operate freely, fit correctly, and be capable of being properly secured in the closed position.
On wagons used for carrying fine materials in bulk (e.g. coal, sand, small stone or gravel, soda ash, salt, lime) it is important that the doors are checked for apertures at the sealing edges, so that loss of load shall not occur in transit. For some traffics the edges of the doors or the door openings are fitted with rubber or other types of flexible seals which must be examined for damage or displacement.
It is not normally required to lubricate door hinges and fasteners on open or flat bottom mineral wagons, but certain classes of wagon such as covered and bottom discharge may require regular lubrication of door hinges, runners and guides or of operating gear and linkages. Advice must be obtained from the C. & W. Supervisor.

(b) Side and end doors of open wagons are generally of the horizontal hinge type and are secured in the closed position by some form of cotter. Care must be taken to ensure that these fastenings are not excessively worn, damaged or missing and that hinge bands and hinge knuckles are not fractured or in any way defective.

(c) Side doors of covered wagons are either vertically hinged or sliding type. In the case of the former it must be ensured that hinges are secure and operate freely. Runners of sliding doors must also be secure and rollers correctly located. Door bolts and fastenings must also be checked to ensure no items are damaged or missing and doors can be securely closed. On insulated wagons the door seals must be in good and effective condition.

(d) Bottom discharge doors on hopper and mineral wagons are generally of the hinge or sliding type. There are varying methods of operating and securing these doors and during examination particular attention should be given to missing, displaced, or defective components.

(e) Top hatch covers on bulk carrying wagons. When examination of these is called for special attention should be paid to the condition of hinges, securing devices and seals.

G10/4. Handrails, Steps and Access Ladders.

These should be checked for security and damage. When such items provide access to above solebar level it must be ensured that the relevant electrification warning notices are fitted and are clearly legible.

G10/5. Floors.

Whenever possible floors, including bolsters, battens, baulks, cradles and chain pockets should be examined to ensure that they are in a satisfactory condition and do not present the possibility of loss or displacement of load or items of equipment which might endanger safety of the line.

G10/6. Load securing Equipment.

It must be ensured that items provided as permanent equipment on wagons, such as binding chains and straps, tensioners, shackles, rings, stanchions, wheel bars, are in good condition and when not in use are safely stowed. Pins used in shackles and brackets must be the correct size, in good condition and properly secured against moving out of position by split cotter pins or other means. The mountings on the wagon frame or body, to which shackles rings and stanchions are attached must be sound.

G10/7. Lamp Brackets.

Vehicles (with the exception of brake vans) which are not fitted with automatic air or vacuum brakes must NOT be fitted with lamp brackets.

Vehicles which are fitted with automatic air or vacuum brakes must be fitted at each end with the standard type of lamp bracket unless coming within the following exceptions:—

1. Tank wagons used for carrying highly inflammable liquids. (These tanks have the barrel painted GREY or ALUMINIUM and solebars painted RED.)
2. Tank wagons used for carrying inflammable liquefied gas. (These tanks have the barrel painted WHITE with a YELLOW horizontal band along the side at the centre line, the solebars painted any colour EXCEPT red and carry instruction plates with WHITE lettering on a RED ground.)
3. Tank wagons used for carrying non-toxic gas which is compressed liquefied or dissolved under pressure (These tanks have the barrel painted WHITE with a YELLOW horizontal band along the side at the centre line, the solebars painted any colour EXCEPT red and carry

instruction plates which have BLACK lettering on WHITE ground.)
For safety reasons, only approved electric lamps must be fixed to tank wagons described in 1, 2 and 3 above and for this reason such wagons must be fitted with the modified design of lamp bracket which has a projecting stud to prevent an oil lamp being attached. The approved electric lamp will fit on to these modified brackets.

4. Tank wagons used for carrying toxic gas which is compressed, liquefied or dissolved under pressure. These tanks have the barrel painted WHITE with a YELLOW horizontal band along the side at the centre line, and carry instruction plates which have BLACK lettering on YELLOW ground.
A tank wagon as described in 4, must not be formed as the end vehicle of a train either leading or trailing end and for this reason must not be fitted with lamp brackets.

G10/8. Shock Absorbing Wagons.

The body of these wagons can move longitudinally on slides on the wagon frame, the movement being resisted by friction of the slides and the pressure of the shock absorbing springs. Most of these wagons have rubber shock absorbing springs visible on the outside of the wagon frame. Some have a pneumatic shock absorbing device fitted to the wagon frame underneath the body.

The body slides must be kept lubricated and rubber springs examined for visible deterioration.

After movement on the slides during shunting impact, the body should always return to mid-position.

Wagons found with the body remaining off centre to one end should be labelled for repairs.

Special attention should be given to the condition of the centre section of the floors at the doorways as these are often damaged during loading operations.

G10/9. Pressure Discharge Vehicles—Presflo, "Prestwin" etc.

Whenever possible, opportunity should be taken to examine pressure discharge type wagons at the unloading points when discharge is taking place to ensure that pressure gauges and valves operate correctly and there is no pressure leakage from the loading hatch covers.

No attempt must be made to attend to defective valves, covers, fastenings or to free a blocked outlet or air pipe while there is any pressure in the body.

G10/10. Goods Brake Vans.

Particular attention should be given to items affecting the safety of staff riding in brake vans, e.g. step boards, door catches, bars. Stoves and stove pipes, duckets, windows and furnishings must be examined to ensure freedom from damage and it must be ensured that stove pipes are fitted with stops to prevent them being raised high enough to foul overhead live wires. Warning notices regarding this hazard must also be affixed to the adjacent interior body side. Each van must be equipped with 2 sets of 'Track Circuit Operating Clips' assembled on the appropriate mounting blocks.

G10/11. Containers.

Containers must be given the same examination as covered wagon bodies and in addition all items of securing and lifting gear must be in good order.

The lifting gear of containers other than freightliner and ISO types must be examined at yearly intervals at an authorised Works/Repair Depot, the date when the examination is next due being painted on the container. Containers overdue for such examination, or requiring repairs must have 'For Repairs' labels B.R. 11224 attached, but when authorised to be despatched to a Works/Repair Depot should be over-labelled with Cripple Control Label B.R. 11269/11 or 12 as appropriate.

G10/12. Wagons fitted with Hoods.

There are several types of hoods fitted to wagons, for example, on wagons used in the conveyance of strip coil traffic. Hoods must be examined to see that they are not worn or torn, that the lacing, eyelets and dog clips are in good condition and that the Rubacord ties and hooks are in a satisfactory condition.

Attention should also be given to the hood supports, ensuring that horizontal and vertical sheet rails, and arms and elbows, are not distorted or defective in any way.

Wagons must not be allowed to run with the hoods in the 'down' position.

G10/13. Temporary bolting of normally riveted components on freight stock.

Stanchions, door check springs and door hinges which are normally riveted may be temporarily secured by bolts having grover spring washers and split pins and the wagon allowed to remain in service. They must be riveted when the wagon next undergoes Depot/Shop repair.

11. Doors, locks, windows, inside fittings, fire and emergency equipment—coaching stock

G11/1. These items are normally examined and dealt with under depot maintenance procedures. When attending to vehicles in service examiners should bear in mind the following features.

G11/2. Doors, and Door Locks.

External doors must be secure on the hinges and fit correctly in the closed position. In the case of double doors to luggage compartments it is necessary to ensure that the vertical bolts are secure in the guides and will engage correctly at top and bottom when closed.

If, when the door is closed, the external handle does not turn to the fully closed position, this may indicate either a stiff lock or, in the case of a double action slam lock, wear or maladjustment of the striking plate or release plunger. If an external door is found defective, or the lock is not operating correctly, the door should be secured by means of a carriage key and the key hole plugged. Label 'This door not to be used' B.R. 111548 must be affixed to the door and 'For Repairs' labels B.R. 11224 must be affixed to the vehicle. If the vehicle is formed in a train and is allowed to remain in traffic the guard must be informed and the destination station advised by telephone or telegram.

Emergency doors are provided on some vehicles such as Sleeping and Catering Cars. There is no exterior door lock handle on these doors and the interior emergency handle is enclosed behind a transparent cover. This emergency handle must be seen to be in the fully closed position. In addition, by examining the position of the 'Telltale' peg in the slot in the back of the lock casing on the inside of the door it must be proved that the tongue of the lock is in the fully closed position.

G11/3. Windows

When windows are broken on a coaching stock vehicle in service, the broken glass must be removed, exercising extreme caution to avoid personal injury or risk to passengers or other staff from flying splinters and the vehicle dealt with as follows:-

1. Double glazed windows with inner pane or both panes broken, or single pane windows broken:

   (a) Compartment windows - compartment should be locked where possible and labelled 'This Compartment Not to be Used' (Label BR 21777).

   (b) Open stock windows (including DMU, EMU and HST) - should be labelled "This Compartment Not to be Used' (Label BR 21777).

   (c) Corridor windows - the corridor, gangway and vehicle access doors should be locked.

2. Double glazed windows with outer pane broken - no further action required.

The vehicle should then have 'For Repair' labels (BR.11224) attached and be

allowed to continue in service to either destination, an intermediate repair point or termination of the days working, whichever is the more appropriate.

G11/4. Inside Fittings.

Interior fittings found to be defective should be secured, made safe or replaced as necessary.

Particular attention should be given to toilet fittings, and examiners should ensure that the locks, catches and indicators on toilet doors are in good order and operating satisfactorily.

If a toilet is in defective condition and not suitable for use the door should be secured in the closed position and 'Out of Order' label B.R. 29100 affixed to the outside of the door adjacent to the indicator. 'For Repairs' labels must be affixed to the vehicle and the destination station advised.

G11/5. Fire Extinguishers.

These are carried on most coaching stock vehicles in accordance with the instructions contained in the General Appendix. They are also provided in many special purpose vehicles. If any such equipment is found to be visibly defective or missing, arrangements for replacement should be made.

G11/6. Emergency Equipment.

This is provided in passenger brake vans in accordance with instructions in the General Appendix.

If the seal on the cupboard is not intact 'For Repair' labels must be affixed to the vehicle unless it is possible to check the contents of the cupboard and replace any missing items and renew the seal.

12. Propane Gas

G12/1. Instructions for the operation and maintenance of Propane Gas Equipment are contained in B.R. 11372/2 'Propane gas burning equipment on Railway vehicles'.

Examiners who are required to attend to propane gas equipment must make themselves familiar with these instructions.

G12/2. During routine examination at terminal stations examiners should observe the service/reserve gauge and if the needle is in any part of the red sector arrangements should be made for the empty cylinders to be replaced by fully charged cylinders in accordance with local procedures. The position of the manifold changeover tablet must be changed **ONLY** at the time of fitting replacement fully charged cylinders.

G12/3. The replacement of discharged cylinders on service vehicles is normally undertaken by the owning department.

G12/4. The charge of propane in a cylinder is measured by weight, a full charge of liquefied propane being 24lb. The weight of an empty cylinder is about 40lb so that a fully charged cylinder weighs about 64lb. The pressure in the cylinder is about 165 pounds per square inch depending on the temperature.

As propane is drawn off from the cylinder in the form of gas the pressure in the cylinder is maintained by evaporation of the liquid propane and there is no significant variation in the pressure as the propane is used until no liquid propane remains and the contents are nearly exhausted. For this reason the only means of assessing the quantity of fuel in a cylinder is by weighing.

The cylinders on a vehicle are arranged in two banks, one bank marked 'A' and the other 'B'.

The gas used in the gas burning equipment on a vehicle is required at low pressure (14 inches water gauge) and there is a gas regulator in the main supply pipe to control this pressure.

The two banks of cylinders are connected to the regulator through a changeover manifold the action of which is illustrated in the diagram. The gas supply from each bank feeds to a common chamber in the changeover manifold through valves which are controlled by springs and diaphragms. The pressure on the valves is varied according to the position of the camshaft on which the 'A—B' indicator tablet is mounted.

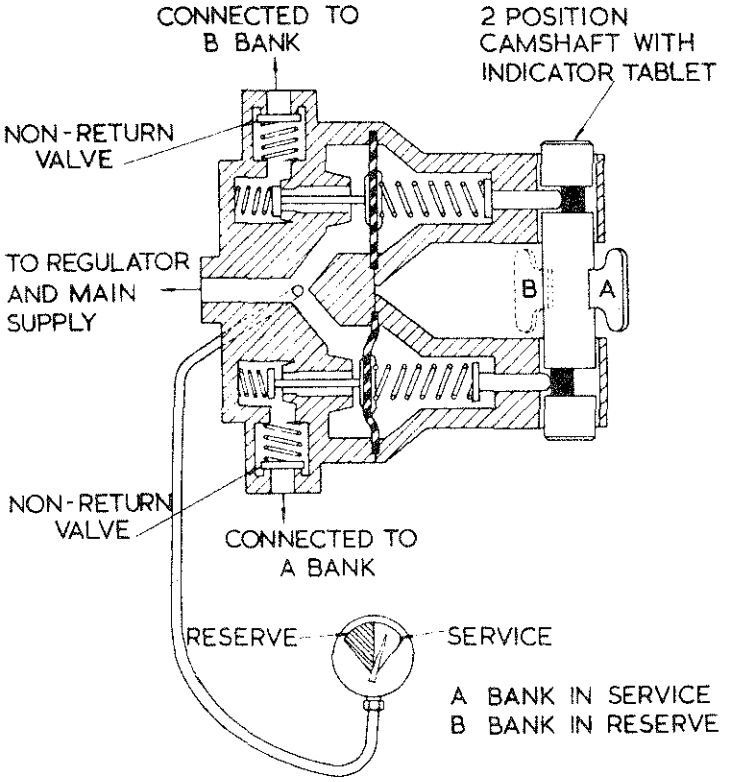
When both banks have fully charged cylinders and the changeover tablet is set to position 'A' the camshaft exerts additional pressure on the valve connecting to bank 'A' causing this valve to open to give communication between bank 'A' cylinders and the regulator. The valve controlling the connection with bank 'B' cylinders remains closed. The 'Service—Reserve' indicator on the solebar (a pressure gauge connected to the chamber of the manifold) will show 'Service' (Green).

When the supply of gas in bank 'A' cylinders has been exhausted the pressure in the chamber drops and the indicator gauge needle moves back from service to reserve (Red). At the same time the reduction in pressure under the diaphragms results in the opening of the valve communicating with bank 'B' and thus the supply of gas to the regulator and supply main is continued. Gas from bank 'B' is prevented from passing into the empty cylinders in bank 'A' by the non-return valve. Although the gas pressure in the chamber when on Reserve is less than when on

Service, the pressure at the burning appliances is not affected, being controlled by the regulator.

If the tablet was now to be moved from 'A' to 'B' the pressure in the chamber would rise and the indicator gauge would move to 'Service' although the 'A' bank cylinders which become the Reserve are empty. IT IS IMPERATIVE therefore that the changeover tablet is moved from one position to the other ONLY at the time when replacement fully charged cylinders are being fitted.

G12/5. SMOKING AND THE USE OF NAKED LIGHTS IS PROHIBITED WHEN DEALING WITH PROPANE GAS EQUIPMENT.



AUTOMATIC CHANGE-OVER
MANIFOLD FOR PROPANE GAS

DIAGRAM G 12/4

13. Steam Heating of Coaching Stock

G13/1. General.

Steam-heated locomotive-hauled coaching vehicles are normally supplied with steam from the locomotive, on which a boiler having a range of working pressure between 50-65lb./sq.in. is controlled automatically by means of a pressure switch. It is a 'non-return' system, the steam eventually condensing and draining away as water. Pre-heating of trains may be carried out by using steam from a stationary boiler or 'shore supply'.

G13/2. Safety.

To avoid the risk of staff being scalded, certain precautions need to be taken before any work is carried out involving disconnection of steam heating equipment. The steam supply to the vehicle(s) concerned must be cut off by closing the end cock of the nearest unaffected vehicle towards the steam supply, and also (to prevent backflow) the nearest end cock of the next unaffected vehicle after the vehicle(s) concerned. (See G13/4/3 Steam End Cocks for explanation of this requirement.)

It must be remembered that although all steam pressure from the vehicle system may have been dissipated through the end cock vents, there is always the possibility of very hot water being trapped in parts of the system and this may discharge when components are dismantled or detached, or when hoses are disconnected.

When changing a flexible hose pipe, or for any reason parting the coupling pipes, the steam end cock should be closed on both vehicles at the adjacent ends to allow quick release of steam pressure. No attempt must be made to separate the two flexible pipes until all steam pressure has been lost. There may still be hot water in the flexible pipes if the drip valves are not functioning.

G13/3. Examination.

Hose couplings, pipes, end cocks and drip valves should be checked for excessive leakage of steam; whenever possible, any such leakage should be rectified. Also, by observation or on information from the Guard, any interior defect should be located and dealt with. Where it is not possible to execute 'on the spot' repairs, 'For Repair' labels No. B.R. 11224 should be attached to the vehicle and the destination station advised. The use of Label No. B.R. 21777—'This compartment not to be used'—may sometimes also be necessary.

G13/4. Principal Components.

1. Main Steam Pipe.

This is a 2" bore steel pipe which extends the length of the vehicle from headstock to headstock and conveys the main steam supply through the train.

2. Auxiliary Steam Pipe.

On most vehicles there is a 1" bore auxiliary steam pipe, extending under the full length of the coach and fed by a connection from the main steam pipe. The heaters in the coach are connected to the auxiliary steam pipe.

3. Steam End Cocks (Cut-off valves).

These are attached to each end of the main steam pipe of the vehicle, either by means of a bolted flange (with gasket) or by screwing directly onto the end of the

main pipe (with hemp wrapped round the thread). The valve is open when the handle is in line with the pipe (generally horizontal) and closed when at rightangles to the pipe (generally vertical). When closed a small exhaust port in the body of the cock permits escape of any steam in the hose pipe and, in consequence, steam from the adjacent coupled vehicle and those beyond; it will, therefore, be appreciated that by closing the end cocks on the adjacent vehicles the steam in the isolated vehicle only will escape.

4. Flexible Hose pipes and Couplings.

These are attached to each end cock by means of a bolted flange or screwed nipple. Each coupling head incorporates a gravity type drain valve, to facilitate drainage of condensate from the hose pipes and a rubber seal to effect a steam tight joint when connected to an adjacent coupling head.

In the event of a gravity drain valve being prevented from properly seating by foreign matter (grit, etc.) and allowing excape of steam, the stem of the valve should be depressed by, for example, a hammer shaft, to allow escape of such foreign matter; in no circumstances should the valve be struck with a hammer to achieve this.

Flexible coupling pipes when not in use must be hung on the hook and chain provided. If not they are liable to become damaged if the vehicle is moved. It must always be ensured that the couplings are not damaged and that the rubber seals are in position and the locking clips not bent but are intact and will engage correctly. A new rubber seal may be fitted without difficulty should this be required.

5. Steam Traps (Drip Valves).

Steam traps are fitted to main and auxiliary steam pipes, and where applicable, to heat exchangers (vehicles with pressure ventilation). They are thermostatically controlled and can open under pressure to allow condensate to be discharged whilst trapping the live steam.

The gravity type drain valves fitted to the flexible pipe couplings are of a type which stay closed under pressure but fall off the seating when the steam pressure is released and thus allow the escape of any water which has collected in the flexible hoses.

It is important to ensure that all steam traps are working correctly, as it will be realised that any build-up of water in the steam system can interfere with the passage of steam throughout the train. A trap which is blowing steam continuously, or one which does not discharge either steam or water, may be defective and should be changed.

6. Radiators.

Steam heating radiators fitted in passenger compartments are located under the seats or along the side of the coach body, being generally screened by a grille. An On/Off quadrant handle accessible to passengers, is connected by rod or cable to a control valve at the end of each radiator, opening or closing the valve through which the steam, reduced to atmospheric pressure by passing through a reducing valve, passes into the radiators. As the steam gives up heat to the radiator, it condenses into water which escapes via a drain pipe. Incorporated in the radiator is a pre-set thermostat which shuts off the supply of steam as the temperature of the radiator increases and admits further steam as it cools. In case of failure of a compartment heater to operate correctly, check that the linkage to the control handle is properly connected.

7. Guard's Heater.

There is generally a vertical mounted radiator in the guard's compartment which operates in a similar manner to the passenger type but has a direct control valve operated by the guard. It is fed with steam directly from the main pipe, not via the auxiliary pipe.

8. Lavatory Heaters.

The steam radiators in lavatory compartments are located in the body side and have no thermostat or manual control.

9. Lavatory Water Heaters.

The supply of hot water to the lavatory wash basin is generally from a hot water tank located behind the partition. The water is heated by steam passing through a pipe in the tank, this acting as a heating element. The steam supply is directly from the main steam pipe via a reducing valve. On later built coaches the water heater is operated electrically and not by steam.

10. Lagging.

To prevent loss of heat and as a precaution against freezing in severe weather, all metal steam pipes are lagged with heat insulating material. Steam end cocks and other exterior components may also be similarly protected.

G13/5. 'Dual' Heated Vehicles.

Many passenger vehicles are fitted with both steam heating equipment and electric heating equipment. They are completely separate systems, except that the same passenger control handles are used to operate either system which may be in use. Electric heating is described in Section G.15.

G13/6. Pressure Ventilation and Heating Equipment.

Vehicles fitted with this system of heating may be steam heated or dual heated (i.e. steam and electric). It is an automatic system by which filtered air, suitably warmed in relation to the outside temperature by being passed over heating elements, is circulated into the passenger compartments by electrically operated fans.

The complete equipment consists of an underframe-mounted pressure-ventilation unit, containing the fan, air filters and heaters, with ducting for air distribution throughout the vehicle, various thermostats, and a control panel mounted inside the coach. The equipment is controlled by a rotary master control 'on-off' switch, normally left in the 'on' position while in service and only turned off at the end of the journey or in emergency; this switch is located in the guard's compartment of brake vehicles or in the vestibule lobby of other vehicles, but must not be confused with the rotary interlock circuit switch referred to in Section G15—Electric Heating. The heating elements concerned will be either steam or electric, depending upon which system is in use on the train.

When on steam heating, the air circulating fan will operate only when (a)the master control switch is 'ON' and (b) when steam pressure is available. (There is a thermostatic switch which interrupts the fan circuit when steam is shut off.)

There are steam traps at the bottom of the cabinet containing the heat exchanger, and it is specially important to see that these are operating correctly. If a

steam leakage occurs in the underframe heating unit, the shut off valve in the steam supply pipe should be closed by turning in a clockwise direction. 'For Repair' labels No. B.R. 11224 must be attached to the vehicle, and the Guard of the train, the Station Manager or Inspector or other person in charge must be informed that the heating is out of use.

G13/7. 'Thermotank' system of heating and ventilating used in Sleeping Cars.

The Thermotank unit is positioned in the roof space at the attendant's compartment end of the vehicle and incorporates two blower motors for hot and cold air respectively. These are controlled by switches in the attendant's compartment. Sleeping berth compartments are fitted with rotary nozzles with adjustment to give 'hot', 'cooler', cold' and 'shut' positions.

The air is heated by a steam heater controlled by a valve opposite the seat in the attendant's compartment; this should only be closed in case of emergency such as a steam leak.

A Thermotank switch panel is provided in the attendant's compartment on which are fitted two gauges, one registering steam pressure and the other temperature. There are two pilot indicating lamps showing when the fan motors are switched on or off. Two three-positional control switches are provided for the hot and cold air fan motors, thus enabling the attendant to reduce the speed of the fans as desired. To allow for the selection of hot or cold air to each berth, both fan motors must be switched on.

Interior and Exterior duct intakes are provided to allow the air to the Thermotank system to be obtained from either inside or outside the vehicle; this arrangement allows warm air to be re-used in extremely cold weather by blanking off the external duct after opening the inner cover. Should the outer cover be on the ballast side of the train when standing at a terminal station, the attendant may seek the assistance of C. & W. staff to open or close the cover as necessary.

Additional steam berth heaters are provided these being controlled by means of 'on/off' valves.

N.B. On 'dual heated' vehicles provision is also made for the air supply to be heated by electric elements.

14. Electric Lighting

G14/1. Detailed instructions for the examination and maintenance of B.R. standard train lighting equipment at outstations are contained in Booklet B.R. 10907 which will be made available to staff engaged on this work.

G14/2. Systems used to generate electricity for train lighting, according to the type or build of the vehicle concerned, are as follows:

(a) Locomotive hauled stock

(i) Dynamo, driven by a single flat belt from an axle mounted pulley, output (DC) being controlled by a regulator.

(ii) Alternator, driven by multiple vee belts from an axle mounted pulley, output (AC) being controlled and converted to DC by a regulator/rectifier unit.

(iii) Motor Alternator, driven by an electricity supply of 800 to 1000 volts AC or DC from the train locomotive, output (AC) being controlled by a special unit. The feed to lighting circuits and batteries is converted to DC by a rectifier unit.

(b) Diesel Multiple Unit Motor Cars.

(i) Dynamo, driven by multiple vee belts from a pulley on the output end of the gearbox, dynamo output (DC) being controlled by a regulator.

(ii) Alternator, driven by multiple vee belts from a pulley mounted directly on the engine shaft, output (AC) being controlled and converted to DC by a regulator/rectifier unit.

(c) Diesel Multiple Unit Trailer Cars.

(i) Dynamo, driven by multiple vee belts from an axle mounted pulley, output (DC) being controlled by a regulator.

(ii) Alternator, driven by multiple vee belts from an axle mounted pulley, output (AC) being controlled and converted to DC by a regulator/rectifier unit.

NOTE:

For the purpose of maintaining the batteries in a good state of charge to provide electrical supply for the lights when the train is stationary or running at slow speed, direct current (DC) is required, hence the need to convert alternator output (AC) into DC. Where fluorescent lighting is fitted the current is reconverted to AC by inverter units.

G14/3. Batteries:

Generally comprised of 12 lead acid type cells, giving an output of 24 volts although certain vehicles are equipped with batteries of 19 alkaline cells.

Mark III coaches are equipped with 110 volt batteries.

G14/4. Fuses:

Most fuses are mounted in non interchangeable fuse carriers located in dynamo connection boxes, lighting control and battery fuse boxes; also in toilet water heater fuse boxes. These fuses should not be rewired by outstation or depot staff, nor the purpose of the carrier defeated by attaching a wire to it or clamping a wire beneath it; only correct replacement fuses must be used.

G14/5. On/Off Control:

In addition to individual lighting switches, most coaching vehicles are fitted with 'through control' switching and inter-vehicle 'jumper connectors' which are located on the ends of the vehicle, just above waist rail height.

In the event of any vehicle lights not switching off normally on 'through control', the 'OFF' relay button in the lighting control contactor box or on the underside of the regulator should be operated to open the lighting contacts.

G14/6. Examination:

1. Dynamo or alternator suspension should be checked to ensure that it is not damaged or insecure and wiring examined for indication of fracture or fraying.
2. Cell boxes should be secure and free from damage and not showing signs of wetness which could indicate damaged cells.
3. Belts should be checked for freedom from damage or loss; in the case of vehicles fitted with multiple vee belts a minimum of three belts is permissible.
4. In the event of any component or wiring showing signs of overheating the belt(s) should be removed or the associated fuse removed.
5. Should a dynamo be found to be 'motoring' i.e. running as a motor powered by the battery, the dynamo positive fuse should be removed from the dynamo connection box.
6. In all cases of defect which do not necessitate withdrawal of the vehicle from service immediately, 'For Repairs' labels B.R. 11224 should be attached whether or not attention has been given; this will ensure a thorough check of the equipment at destination. When applicable the label should be endorsed to indicate whether any failure occurs when the vehicle is in motion or when it is stationary.

G14/7. Electric Multiple Units:

CAUTION. Unless instructed otherwise, examining staff should not touch the electrical equipment.

The lighting systems vary according to the type of power supply used to drive the units, the principal types being as follows:

1. AC Stock.

   The lighting supply is obtained by a tapping from the main transformer being passed through an inverter unit and supplying 110 volts (DC) to the battery and lamps.

2. DC Stock.

(a) Generally fitted with a motor generator driven from the line voltage but supplying 70 volts DC for the battery and lamps.

(b) Certain older stock is fed by the line voltage, each lighting circuit, wired in series, consisting of either 3 lamps at 240 volts, 8 lamps at 85 volts or 10 lamps at 70 volts. It is therefore important to ensure that the correct lamps are fitted in any particular circuit. There are generally 2 circuits per compartment. Should any lamp be removed or become defective the other lamps in the circuit will be inoperative. These units do not have a battery for emergency lighting purposes.

G14/8. Diesel Electric Multiple Units.

The diesel engine drives an auxiliary generator which produces a 90 volt (DC) supply for the battery and lamps. Should this supply be lost, limited emergency lighting only is automatically provided from the battery.

15. Electric Heating

G15/1. WARNING : the electric power supply to coaches is 800/1000 volts.

(a) Before any coupling or uncoupling of the power supply cables between locomotive and vehicles or between vehicles is carried out it must be ensured that the power supply from the locomotive or shore supply is switched off.

(b) Additionally, before any adjustment or maintenance is undertaken to the electrical equipment of a vehicle, the jumper cables at each end of the vehicle must be disconnected.

(c) It should be noted also that the live receptacles at the leading end of the locomotive and at the rear of the last coach connected to the power supply of trains are live when the circuit is complete and power switched on and the flaps must not be opened.

(d) Under no circumstances must cable plugs be allowed to trail on the ground and when not in use must be locked in the receptacle provided on the vehicles.

(e) When a train is being supplied with electric power from a shore supply or locomotive for pre-heating or pre-cooling, the train must be protected by a red flag or red lamp in accordance with General Appendix protection instructions and a warning notice to the effect that the train has electric power supply connected must be attached to the vehicle at the end of the train where such red flag or red lamp is displayed.

G15/2. General.

The electric power from the locomotive (or shore supply) is fed to the coaches by means of jumper cables and plugs in which is incorporated an interlock circuit. The purpose of the interlock circuit is to ensure that no main supply is available until all jumper cables are properly connected ; this includes the rear jumper cable on the last vehicle connected to the power supply, i.e. the cable farthest from the source of supply, which must be locked in the dummy receptacle before the circuit is completed. Similarly, when disconnecting vehicles, the interlock circuit provides protection since it ensures that the supply is broken before a plug is removed from its receptacle.

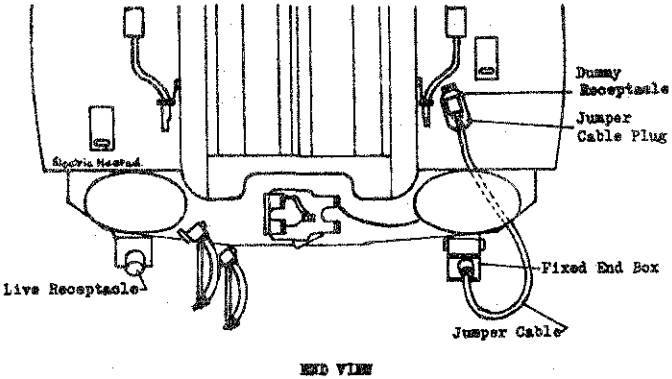
The interlock circuit is fed at 110 volts DC and is entirely separate from the 800/1000 volts main supply.

The power supply cables run either under or in the floor of the vehicle to the distribution box in which are fitted fuses, some of which have isolation links.

A number of different types of equipment are used in compartments/saloons and corridors, being controlled either by passenger operated quadrant handles or by thermostats, thus enabling the temperature to be controlled within comfortable limits.

Toilet water heaters are also thermostatically controlled.

G15/3. Electric Power Supply End Couplings.



A jumper cable with plug attached is fitted beneath the right hand facing buffer at each end of each coach; fitted under each left hand buffer is a live receptacle. The locomotive, from which the power supply is taken, is also fitted with similar plugs and receptacles.

G15/4. Coupling of Jumper Cables.

Each jumper cable plug must be uncoupled from its dummy receptacle by rotating the plug in an anticlockwise direction. It must then be inserted into the live receptacle of the adjacent vehicle and rotated in a clockwise direction to lock the jumper cable in position, thereby completing the electric power circuit. The spring lid dust cap will engage with the jumper cable plug to lock it in position.

When vehicles are being attached either to a locomotive or to other vehicles coupled to the locomotive or to a shore supply, the locomotive jumper cable or the jumper cable of the rear vehicle so coupled must be the first cable to be removed from its dummy receptacle.

G15/5. Uncoupling of Jumper Cables.

Each jumper cable plug must be rotated in an anti-clockwise direction to break the electric power supply circuit before removal of the plug which must then be locked in its dummy receptacle.

G15/6. Emergency Measures and Precautions in case of Fire.

A rotary interlock circuit switch, covered by a glass panel and located in one of the vestibule lobbies of each vehicle, is provided for use in emergency to disconnect the electric power circuit. The glass over the switch must be broken and the switch rotated to the 'off' position; the operation of any one switch in this manner will break the electric supply circuit throughout the train.

In the event of fire, the circuit must be switched off, as described, before fire extinguishers are brought into use.

G15/7. Procedure in Event of Failure.

Should the assistance of an Examiner be requested in the event of a failure in the electric heating system, he should ascertain from the Driver whether the electric train heating indicator on the locomotive is illuminated when the E.T.H. button is pressed. If so, this would indicate that the interlock circuit is satisfactory and that any fault must lie in the coach equipment. If the indicator is not illuminated, however, this would indicate some fault in the interlock circuit and a check should be made to ensure:

(a) that none of the rotary interlock circuit switches have been turned to the "off" position and

(b) that all intermediate jumper cable plugs are correctly locked in the live receptacles and those at the front of the locomotive and at the rear of the last vehicle in their respective dummy receptacles.

Should no fault be found in respect of these requirements, the jumper cables between two coaches mid-way in the train should be uncoupled and placed in their dummy receptacles and the driver again requested to operate his E.T.H. button and note whether the indicator is illuminated. If so this would indicate that the fault must lie in the rear portion of the train or if not illuminated that the fault is within the front portion.

CAUTION. If the indicator has been illuminated, indicating that the circuit has been established, it must be ensured that the power is switched off before further coupling or uncoupling of jumper cables is attempted.

The jumper cables at the centre of the train should then be reconnected to the live receptacles, cables midway in the now established defective portion of the train uncoupled and placed in the dummy receptacles, and a further trial made to establish circuit continuity. This procedure should be repeated as necessary until the defective vehicle is located.

If an interlock circuit fault is located and it cannot be readily rectified, the vehicle concerned should either be detached or it, and consequently the vehicles behind it, isolated from the electric power supply. After such detachment or isolation it should be ensured that all cables in the portion of the train to be supplied with electric power are correctly coupled before such power is switched on.

A similar procedure of elimination should be followed in identifying a vehicle on which the coach equipment is faulty and similarly the vehicle concerned should be detached or isolated from the power supply.

Any vehicle on which a fault is located should have 'For Repair' labels B.R. 11224 attached and in the event of a train departing incompletely supplied with electric power, the next stopping station/destination must be advised, stating

the defect and details of any tests already completed in order that further attention may be given.

G15/8. Pressure Ventilation and Heating Equipment.

The equipment is as generally described in Section G13/6 but as an alternative to the duct air being heated, as necessary, by steam heating elements, it may, on 'dual heated' vehicles, be heated by electric elements. A protection device prevents the heaters being switched on until the fan is running; after a temperature of approximately 63°F(17°C) has been attained the heaters are then thermostatically controlled.

16. Air Conditioning

G16/1. General.

The purpose of air conditioning is to supply fresh, filtered air at a comforatble temperature throughout the coach, regardless of exterior temperature or climatic conditions. The equipment automatically provides Heating, Ventilating or Cooling, cycling in accordance with the demands of thermostats sensing the interior temperature of the coach. The heating and cooling equipment is operated by electric power from locomotive or shore supply only: the vehicles are not dual-heated.

G16/2. MkIID and MkIIE Coaches.

1. The equipment for each coach consists of the following principal components:

Compressor Unit	Air Filters
Condenser Unit	Control Equipment
Evaporator Unit	Heating Control Box
Heating Unit	Master Control Switch

The Compressor, Condenser and Heating Units, together with the Control Equipment and Heating Control Box are mounted on the vehicle underframe; the Evaporator Unit is located in the roof of the coach, at the Number 1 end, being concealed by the ceiling. The air filter for the heating cycle is located within the heating unit; for the cooling and ventilating cycles the fresh air filter is at cantrail level, accessible from outside the coach, and the recirculation filter is at luggage rack level within saloons or in the corridor of compartment vehicles.

The Master Control Switch, mounted behing a hinged panel in one of the vestibule lobbies adjacent to the toilet is of the 'On-Off' tumbler type and when in the 'On' position an adjacent green light presents an indication of this. To gain access to the switch the two locks of the hinged panel are operated by a standard B.R. combination carriage key.

2. During the heating cycle, filtered air, warmed by electric heating elements within the Heating Unit is circulated via underframe ducting into the vehicle through vents beneath the passenger seats and at floor level in the toilet compartments.

3. During cooling or ventilating cycles the filtered air is circulated by a fan situated in the roof behing the Evaporator Unit, being distributed into the coach via ducting which extends the length of the vehicle and through meter boxes adjacent to the ceiling lights.

Equipment Cycling.

(a) Pre-Heating. This cycle is initiated if the air in the recirculating duct of the vehicle is below 18°C (65°F). During the cycle all the warmed air is recirculated, being drawn from within the coach, passed through the filter and over the heating elements and redistributed into the vehicle.

With an ambient temperature at or below freezing point a minimum of 75 minutes will be taken to raise the coach temperature to 18°C.

(b) Heating. This cycle will be initiated when the coach interior temperature is in the zone 18°C to 21°C (70°F), but the air, similarly filtered and warmed will be composed of 75% fresh air and 25% recirculated air.

(c) Ventilating. This occurs between the heating and cooling cycles when the interior temperature is in the zone 21°C (70°F) to 23°C (73°F), the cooling fans operating but without the refrigerant operation of the cooling cycle.

(d) Cooling. This cycle is initiated when the interior temperature of the coach is 23°C or above.

In both the Cooling and Ventilating cycles the air distributed is a mixture of fresh and recirculated air.

5. The Guards food warmer and the toilet compartment hot water supply are heated by the electric power supply from the motor/alternator, powered from the locomotive.

G16/3. MkIIF Coaches.

1. The cyclic operation of the equipment is similar to that of the Mk IID and E coaches and operates within the same temperature ranges, but no underfloor ducting is fitted. The heater is located in front of the evaporator unit in the roof section; fresh and recirculated air is introduced into the coach at the cooling vents, during the heating cycle as well as during the cooling and ventilating cycles.
Additionally radiated heat is supplied by electric panel heaters fitted at floor level to the coach body sides, these also being thermostatically controlled. Heating is always at both floor and roof level, never separate. During the pre-heating cycle, the air is all recirculated, the fresh air inlets being closed by automatic shutters.

2. The Master Control Switch is mounted in a similar position to that in the MkIID and E coaches, but is operationally different. It is of the rotary type and has four positions 'Off'—'Auxiliaries Only'—'Auxiliaries and Air Conditioning'—and 'Auxiliaries Only'.
Only in emergency or when the vehicle is to stand out of service in excess of two days should the switch be turned to the 'Off' position, since this will prevent use of the coach lighting and public address system. It should also be noted that lights cannot be switched off when the Master Control Switch is in the 'Off' position.
When the vehicle is coupled to a shore supply for 'pre-conditioning' or at the commencement of a journey, the switch should be placed in the 'Auxiliaries and Air Conditioning' position. At the end of the journey it should be rotated to one of the 'Auxiliaries Only' positions.

17. Combustion Heaters—Diesel Multiple Units

G17/1. General Description.

Each vehicle is separately heated by means of either one or two oil burning heaters, each heater operating by the combustion of a continuous spray of oil in an enclosed combustion chamber. The products of combustion pass from this chamber through radial ports into a heat exchanger and thence to an exhaust outlet. The heat generated by the combustion is transferred through the heat exchanger to the air used as a medium for space heating; an air supply is provided to the combustion chamber to support the combustion of the oil, but this is entirely separate from the air used for space heating.

Ignition of the oil spray is achieved on Smith's combustion heaters by means of a glow plug—a small coil element on a mounting similar to a sparking plug—and on Dragonair heaters by a spark initiated by a booster coil.

The heaters are secured to the underframe of the vehicle, with air ducting leading from each heater into and along the interior and having small outlet ports. In some cases air is drawn back to the heater for re-heating and recirculation and in others fresh air is drawn into the heaters through underframe mounted filter units.

Heaters may be either semi-automatic i.e. requiring to be switched on and off individually at a local panel or fully automatic, i.e. able to be switched on and off either from a local panel or by through control from each guards van and being controlled thermostatically while switched on.

G17/2. Location of Heater Switches.

1. In the Driver's compartment of driving vehicles.
2. In the Guard's van of brake vehicles without a Driver's compartment.
3. Over one of the doorways inside trailer cars having neither Driver's compartment nor Guard's van.
4. In the Guard's van of units fitted with through heating control.

G17/3. Operation of Heaters not fitted with Through Heating Control.

1. When the heater switch is turned to the 'Full Heat' position, the glow plug indicator bulb should then be illuminated indicating that the glow plug is operating. If the light does not appear and after 30 seconds the air fan indicator bulb is not illuminated, the switch should be turned to the 'Off' position.
2. 30 seconds after switching on, the air fan bulb should become illuminated, indicating the operation of the air fan and fuel pump.
3. Approximately 3½ minutes later the glow plug light will be extinguished and the air fan light will remain illuminated, indicating that the heater is operating normally.
4. If the oil fails to ignite during this 3½ minutes the fan and fuel pump are automatically switched off. The heater switch should be returned to the 'Off' position and the switching on sequence repeated. If a total of 3 attempts prove unsuccessful the heater may be regarded as defective.

5. In the event of a heater cutting out for any reason, the air fan light will be extinguished. The switch should be returned to the 'Off' position and the switching on sequence repeated as in item 4.

NOTE: The 'Reduced Heat' position on the panel is not effective as such but gives a similar output to the Full Heat position.

G17/4. Operation of Heaters fitted with Through Heating Control.

1. Control of each heater may be exercised individually at its local panel or from the Guard's control panel which enables all heaters in the set to be operated from the one point.

2. Heat cycling operation from Guard's panel.
   (a) Each local panel selector switch must be in the 'heating' position and each isolator switch in the 'off' position.
   (b) The 'heating' position should be selected on the Guard's panel.
   (c) The 'isolator' switch on the Guard's panel only should be turned to the 'on' position. Both 'failure' and 'isolator' indicators on all panels will illuminate showing that there is a battery supply to each heater control but that each heater is in a non-operated or failed condition.
   (d) When the starter button on the Guard's panel is pressed the 'failure' lamp on all panels will extinguish; each heater will then be under the control of the carriage temperature thermostat and will commence a starting cycle.
   (e) To switch off all heaters the Guard's isolator switch must be turned to the 'Off' position. All indicator lamps will be extinguished and all heaters will then go through a shut down cycle and finally cease running.

   NOTE: If an individual heater isolator switch has been left in the 'On' position this heater cannot be switched off by through control and will require switching off individually.

3. Heater control from the heater local panel.
   (a) The selector switch must be in the 'heating' position.
   (b) The isolator switch must be in the 'On' position.
   (c) The starter button must be pressed.
   (d) To switch off the isolator switch must be turned to the 'Off' position.

G17/5. Ventilating.

Heaters may be used for circulating unheated air by placing each selector switch in the 'ventilating' position and turning the isolator switch, either on the local panel for individual control, or on the Guard's panel for 'through' control, to the 'on' position.

18. Painting, Lettering and Marking

G18/1. General Livery.

1. Coaching Stock.

(a) Pullman vehicles:

Bodysides—below waistline—Rail grey
above waistline—Rail blue, except for a 3" band of rail grey below the cantrail.

Bodyends—continuation of bodyside colours.

(b) Express passenger train vehicles, including non-passenger carrying vehicles allocated to such trains:

Bodysides—below waistline—Rail blue
above waistline—Rail grey, except for a 3" band below the cantrail—the rail grey panel framed by a ½" white band.

3" Cantrail band—On non-passenger carrying vehicles, over brake compartments and over second class accommodation—rail blue.
Over first class accommodation—yellow.
Over catering accommodation—red.

Bodyends—Rail blue.

(c) Local and Suburban train vehicles:
Bodysides—Rail blue.
Bodyends—Rail blue, except driving cab ends of multiple unit vehicles which are painted yellow.
3" Cantrail band over first class accommodation—yellow.

(d) Non-passenger carrying vehicles except as included in (b)
Bodysides—Rail blue.
Bodyends—Rail blue.

(e) Vehicles allocated to Royal Trains—Burgundy.

(f) Exhibition or privately owned coaching stock and vehicles allocated to Passenger Transport Executives may be in any approved livery.

NOTE: Additional to the basic liveries detailed above many vehicles bear appropriate legends on the bodysides, generally in white lettering, signifying their allocation or function.
e.g. Pullman — Inter-City — Sleeper — Restaurant — Buffet etc.

2. Freight Stock.

(a) Wagons - Freight Brown.

(b) Freightliner wagons (except Batch 1), motorail carflats and BR cartic sets - Rail blue.

(c) Meat and Fish Vans and bulk sugar wagons - Ice blue.

(d) International refrigerated vans - White.

3. Departmental Service Vehicles.
   (a) Breakdown train vehicles - Post Office red, but being repainted yellow with black/yellow waist line.
   (b) Civil Engineers rail mounted track plant, including match trucks—Yellow.
   (c) Officers' saloons and other special vehicles—Rail blue/grey.
   (d) Test and Research vehicles—Rail blue below waistline, red above waistline.
   (e) Vehicles required to run with other coaching stock—Rail blue.
   (f) All other vehicles, irrespective of whether purpose built or ex traffic—Olive drab.

4. Internal Use Vehicles—Olive drab with 12" St. Andrew's cross on left hand end at each side: such wagons must be confined to Station or Depot limits.

G18/2. Vehicle Numbering.

1. Coaching Stock.
   (a) The number is located at the right hand end on each side of the vehicle.
   (b) B.R. designed passenger carrying vehicles are numbered in the following ranges:

Loco.-hauled vehicles	1 - 39,999
HST (DEMU) Vehicles	40,000 - 49,999
DMU Vehicles	50,000 - 59,999
DEMU/EMU Vehicles	60,000 - 78,999
DMU Vehicles	79,000 - 79,999

   (c) B.R. designed loco hauled non-passenger carrying vehicles are numbered in the following ranges:

Catering and Post Office Vehicles	80,000—80,499
Others	80,500—99,999

   (d) Pre B.R. designed vehicles are numbered in accordance with the respective block of numbers adopted by each of the pre-nationalisation railway companies.

2. Freight Stock.
   (a) The number is located at the left hand end on each side of the wagon.
   (b) The number ranges vary according to the type of wagon and the year built.
   (c) Certain wagons such as fish vans, milk tanks and Cartic sets are numbered in the non-passenger carrying coaching stock range.

(d) Privately owned wagons, although bearing unique numbers on the register plate, originally bore painted numbers in the Owners own series. New numbers are now being allocated which will prevent possibility of duplication.

3. Departmental Service Vehicles.

Service wagons and converted coaching stoch vehicles are numbered in the B.R. Freight Stock ranges.

4. Internal Use Vehicles.

These are numbered in accordance with number ranges allocated to the respective Regions:—

L.M. Region	E. Region	W. Region
020000—039999	040000—059999	060000—079999
S. Region	Sc. Region	
080000—089999	090000—099999	

G18/3. Letter prefixes and suffixes to Vehicle Numbers.

1. Coaching Stock.

(a) Each vehicle carries a prefix letter indicating the Region to which the vehicle is allocated.

(b) A suffix letter to the number indicates, as applicable, the Region or prenationalisation railway company by whom the vehicle was designed.

2. Freight Stock.

(a) All B.R. designed wagons originally bore a prefix letter 'B'. This prefix is however being omitted on modern air braked freight stock.

(b) Wagons designed and built before nationalisation bear a prefix indicating the railway company by whom the vehicle was designed e.g. E.M.S. or W., (indicating L. & NE., L.M. & S., S. or G.W. Railways respectively).

(c) A 'P' prefix indicates a formerly privately owned wagon taken over by B.R. nationalisation.

(d) Privately owned wagons are being allocated new prefix letters generally indicative of the owners initials, when new numbers are allocated as referred to in G18/2/2(d).

3. Departmental Service Vehicles.

(a) All service vehicles bear an additional prefix letter D signifying 'Departmental' use.

(b) Additionally a third prefix letter is used to indicate the Department by which the vehicle is owned (except in the case of the C.C.E. department) in accordance with the following:—

A. C.M. & E.E.

L. C.M. & E.E. (BR HQ) Electrification.

K. C.S. & T.E.

T. General Mgr., Divisional Mgr., Operating, Commercial and Motive Power.

R. Research.

X. B.R.B. Supplies Manager.

Z. B.R.B. Public Relations and Publicity.

C. B.R.E.L.

P. Shipping and International Services.

4. Internal Use Vehicles.
These vehicles do not bear either prefix or suffix lettering.

G18/4. Vehicle Type Coding.

1. Coaching Stock.
Certain vehicles carry, in large lettering on the body side, an indication of their general function e.g. Restaurant, Buffet, Motorail etc., but more detailed type identification is afforded by code lettering or wording as follows :—

(a) Passenger Train Vehicles.

Code lettering located on left hand bottom corner of each body end. A combination of initial letters, each of which represents a particular feature of design/purpose

e.g. F = First Class Accommodation
S = Second Class Accommodation
C = Composite first and second class accommodation
U = Unclassed—generally associated with restaurant facilities
B = Brake Compartment—with Guard's accommodation, handbrake, power brake application valve and luggage etc. accommodation.
G = Gangway
K = Corridor and therefore signifying compartment accommodation (when the last letter of the code)
O = Open and therefore signifying saloon accommodation
T = (loco. hauled vehicles)—64 seats.
R = Restaurant accommodation
B = Buffet accommodation—(when the last letter of the code).
RK = Kitchen
SL = Sleeping accommodation
L = Lounge
M = Motor car—multiple unit vehicles
T = Trailer car—multiple unit vehicles.

Example BCK. A corridor coach with compartment accommodation for first and second class passengers and a guards compartment, with hand brake and power brake application valve, luggage, etc. accommodation, and inter vehicle gangways.

(b) Non Passenger Vehicles.

Code lettering located at right hand end of body side. Generally a combination of initial letters of words describing the design/purpose of the vehicle or a codeword allocated to the particular type of vehicle.

e.g. GUV — General Utility Van
CCT — Covered Carriage Truck
PMV — Parcels & Miscellaneous Van
Siphon G — A Western Region type Bogie van.

2. Freight Stock.

Coding located at left hand end of body side, above wagon number. Generally a code word derived from the principal feature(s) of the vehicle, coupled as appropriate, with the initial letters of the type of power brake fitted (AB—Air Brake, VB—Vacuum Brake). Figures denoting the carrying capacity may also be included.

e.g. Cov. AB — Covered van with air brake
Covhop — Covered hopper wagon
Coal 16 — a 16 ton capacity coal wagon, with handbrake only.

Gradually this method of coding wagons is being superseded by the TOPS wagon type code as depicted in the TOPS Wagon Code Booklet. This is a 3 character code of the form :—

e.g. VAB — Covered van with airbrake and vacuum through pipe
CHV — Vacuum fitted covered hopper wagon
MCO — A 16 ton capacity coal wagon, with handbrake only.

Departmental Service Vehicles.

Coaching Type service vehicles generally bear lettering on the body side indicating the vehicles purpose e.g. Mess & Tool Van, Riding Van etc. Wagons are generally clearly marked with details of their purpose.

Chief Civil Engineer's purpose-built freight vehicles each have 'Fish' code names—e.g. Walrus, Dogfish, Sea Lion etc. They will also bear the TOPS Wagon Code.

G18/5. Other Lettering and Marking.

The foregoing subsections refer to lettering and numbering which contribute to the identification of individual vehicles and vehicle types. Other information carried on vehicles covers a very wide field but will in general be found to be associated with one of the following categories :—

1. Information necessary to the general operation of the vehicle concerned.

Examples (a) Route availability—generally determined by the dimensions and weight of the vehicle concerned, with any restrictions specified.

(b) Maximum speed—in the case of freight stock specified for varying conditions of loading.

(c) Tare weight.

(d) Carrying capacity—on passenger stock specifying accommodation for first and for second class passengers; for other stock, not only to ensure compliance with limits in regard to the loading of the vehicle, but also, with (c) in respect of the axle loading limits specified by the C.C.E. for the route concerned.

(e) Type of brake—to ensure compatibility of vehicles for the required train formation.

(f) Brake Power—on freight stock this is specified for varying conditions of loading (H.M.L. or E.).

NOTE: On freight stock the above information is additionally contained on thin plastic labels (yellow with black lettering) stuck on each solebar of the wagon (or in some cases stencilled) for easy reference by guards and other staff concerned in train assessment.

(g) Details of technical features of the vehicle—as well as supplying information in respect of the vehicle design and equipment fitted, this information assists in ensuring compatibility of vehicles for train formation—e.g. air or vacuum brake—electric, steam or dual heating of coaching stock—etc. (On multiple unit stock code signs such as blue square, red triangle etc. on the end of the vehicle facilitate determination of compatibility).

(h) Instructions associated with the procedure for discharge of loads e.g. pressure discharge, bottom and side door operation etc.

(i) Location of brake release cords, isolating cocks etc.

(j) Internal notices relative to equipment operation on passenger stock.

(k) Safety instructions and warning notices.

2. Information associated with the maintenance/repair history of the vehicle.

(a) Coaching Stock.

On the end of the vehicle—shopping proposal date, last lift date and previous repair history.

On underframe solebar—date of last brake overhaul and of last buckeye examination; also date of steam heating equipment overhaul.

On vehicles of integral construction—i.e. having no conventional solebar—special plates are fitted for recording this information.

An arrow on the bodyside indicates No. 1 wheel for identification purposes, other wheels being identified by numbering consecutively in a clockwise direction.

Pad exam and oiling records (in accordance with Section G9).

Vehicle build plate—indicating builders name and year of construction, secured to underframe solebar.

(b) Freight Stock.

In the C.M. & E.E. panel at the right hand end of the body side—details of date and depot carrying out last intermediate repair, lift, brake overhaul, pad examination and oiling. An arrow in one of the C.M. & E.E. panels indicates No. 1 wheel or vehicle corner for identification. Other wheels/corners are identified by numbering consecutively in a clockwise direction. Details of last general repair and of last intermediate repair are recorded on plates fixed to the solebar.

(c) Freight Stock Preventive maintenance—See Section E1/2.

3. Information provided within vehicles for passenger convenience and safety (generally plastic notices).

This category includes such notices as No Smoking—Alarm Signal—Emergency and First Aid Equipment—Luggage Storage etc; also instructions concerning the operation of passenger-controlled heating, toilet flushing, water supply, etc.

4. Some examples of Vehicle Markings and their meanings.

Markings	Significance
Diagonal white stripe on side of mineral wagon.	Position of end door.
Two short white lines in the form 'V' at bottom centre of wagon side.	Bottom doors.
Vertical white stripes, 3 on each side and ends.	Equipped with shock-absorbing gear.
Large solid yellow triangle pointing upwards on side of 24½-ton mineral wagon.	To distinguish from 21-ton mineral wagon.
Solid yellow circle on body side.	Circuit-working vehicle.
Black or white stars on underframe.	Position of vacuum or air brake release cords.
Letters 'I.C.D' and 'I.C.R.' on solebar or special plate.	Position of distributor and main reservoir pipe isolating cocks on air braked vehicles.
Solid white or black triangle pointing downwards on solebar or or wagon side.	Fitted with two vacuum brake cylinders and manual changeover gear to adjust brake for empty or loaded running (See Section G7/5).
Solid semicircle added to top of this triangle.	Equipment modified (See Section G7/5).
The sign ℄ on side of bogie bolster wagon.	indicates position of centre line.
Letters 'RIV' enclosed in rectangle on side of vehicle.	Conforms to the requirements for running over Continental railways (See Section F1/2).
Anchor surrounded by a rectangle on side of Continental ferry wagon.	Approved for running on B.R. Lines (See Section F1/2).
Top half of circle, with a cross at either end, on side of wagon used for international traffic.	Must not be allowed to pass over a shunting hump.
Letter 'L' on side of WR china-clay wagon.	Longitudinal floorboards.
White letter X on black background on wagon side.	Internal use only.
Letters 'COND' in white on wagon side.	Condemned vehicle.
Length measurement between arrows on side of Continental ferry wagons, e.g. —→ 10.50m ←—	Indicates wheelbase or distance between bogie centres.
Bogie suspension springs painted distinctive colours.	Identification of springs of particular groups.
Other components painted distinctive colours.	Either to indicate compatibility or in some cases to indicate modification.

19. Principal dimensions in practical metric form

NOTE: The metric dimensions quoted are not necessarily accurate conversions of the relevant imperial dimensions but are rounded up or down as considered appropriate according to the application to give a metric dimension suitable for practical use.

Index	Description of Dimension	Imperial Dimension	Metric Dimension
G2/3	Maximum allowable length of wheel flats	2½″	60 mm
G2/6/2	Size of stamping of profile identification on wheel sets	⅜″	10 mm
G2/7(d))	Radius gauge for wheel flange build-up	3/16″	4·5 mm
G2/8/1	Maximum allowable variation in wheel diameters		
	1. Coaching Stock		
	Between two wheels on same axle	0·010″	0·25 mm
	Between pair of wheels on one bogie (compensated brakegear)	½″	13 mm
	Between pairs of wheels on one bogie (non compensated brakegear)	1/16″	1·5 mm
	Between bogies on a vehicle	1″	25 mm
	2. Freight Stock		
	Between two wheels on same axle	0·020″	0·5 mm
	Between pairs of wheels—4 wheeled wagons	1″	25 mm
	Between pairs of wheels—6 wheeled wagons	⅛″	3·5 mm
	Between pairs of wheels on one bogie	½″	15 mm
	Between bogies on a vehicle	1″	25 mm
G2/9/1	Maximum length of journals in excess of nominal:		
	Pass. carrying	1/16″	1·5 mm
	Non Pass. carrying	3/32″	2·4 mm
	Freight	⅛″	3·5 mm
G3/3	Springs—Maximum allowable movement of top plates	¼″	7 mm
	Springs—Maximum allowable movement of other plates	½″	15 mm

Index	Description of Dimension	Imperial Dimension	Metric Dimension
G3/3—cont.	Matching of Springs—Variation in camber at 2 ton load	1/16″	1·5 mm
	Maximum allowable variation in spring camber—Empty wagons	¼″	7 mm
	Maximum allowable variation in spring camber—Loaded wagons	½″	15 mm
	Test weight for spring camber	2 tons	2 tonnes
G3/4	Maximum allowable wear on spring shoes	3/16″	5 mm
	Minimum allowable thickness of top spring plate due to wear	½″	12·5 mm
	Maximum allowable distance between pin centres—		
G3/7	—Friction Link Susp.	1′ 2 3/16″	360 mm
G3/8	—M.G.R. Susp.	5 3/16″	132 mm
G3/10	Bogie side bearer clearance	⅛″	3·5 mm
G4/12	Buffer Heights Maximum	3′ 6″	1067 mm
	Minimum	3′ 5½″	1054 mm
	,,	3′ 5¼″	1048 mm
	,,	3′ 4″	1016 mm
	,,	3′ 3½″	1004 mm
	,,	3′ 2½″	978 mm
	,,	3′ 1″	940 mm
G4/13	Coaching stock tread plate height Maximum	4′ 3½″	1308 mm
	Minimum	4′ 2¾″	1289 mm
	Buffer Projections Freight Stock	1′ 6″	457 mm
		1′ 8½″	520 mm
		2′ 0½″	620 mm
	Coaching Stock	1′ 10″	559 mm
G4/13	Thickness of Drawbar plates or extensions	¾″	20 mm
		2 1/16″	52 mm
		3½″	86 mm
		7¼″	184 mm
	Buffer Stroke— Freight Stock	6 7/16″	164mm
	Coaching Stock	4¾″	121mm
		4½″	114 mm
		5″	127 mm

Index	Description of Dimension	Imperial Dimension	Metric Dimension
	BR Std Drawbar A-E		
G5/3	Drawbar gedge slot maximum allowable width	13/16"	30 mm
	„ hook—maximum allowable wear	⅝"	20 mm
	„ tail rod—minimum allowable diameter	1½"	38 mm
G5/7	Coupling shackle lengths—nominal	9⅛"	232 mm
		10⅛"	257 mm
		13⅛"	333 mm
		14⅛"	359 mm
G5/13	Instanter Couplings		
	End links (all types)—minimum thickness of link at ends	13/16"	30 mm
	Instanter links—Round section		
	—minimum thickness of link—long or short	111/16"	43 mm
	Maximum inside length	10⅝"	270 mm
	—Oval section		
	Minimum thickness at top in long position	1¾"	45 mm
	Minimum thickness at bottom in long position	17/16	37 mm
	Maximum inside length	10⅝"	270 mm
	—Flat of fluted section		
	Minimum thickness at top in long position	2¼"	57 mm
	Minimum thickness at bottom in long position	115/16"	50 mm
	Minimum thickness in short position	2⅜"	60 mm
	Maximum inside length	9⅞"	250 mm
	B.R. Standard Screw Coupling Min. Dimensions:		
	End Shackle	13/16"	30 mm
	Side of shackle	19/32"	32·5 mm
	Dia. of trunnion end	1⅜"	35 mm
	Dia. of trunnion thread	115/16"	49 mm
	Dia. of screw thread	113/16"	46 mm
	Edge of hole to end of shackle	15/16"	24 mm
	Difference between screw thread and trunnion thread	3/32"	2·5 mm
G6	Brakes Minimum block thickness	⅝"	15 mm
	„ „ pad „	¼"	6·5 mm
	Block clearance	⅛"	3·5 mm

Index	Description of Dimension	Imperial Dimension	Metric Dimension
G6—*cont*			
	Pad clearance	1/32"	1 mm
	" "	1/64"	0·5 mm
	Split pins	1/8"	6·5 mm
G6/5	Minimum clearance of brake lever pin above rail	6"	155 mm
G6/11	Brake Regulators—Distance 'A' Coaches	5/8"	16 mm
	A.B. Wagons	7/32"	6 mm
	Cartics	1 1/8"	32 mm
G7/4	Wire for tying disconnected cylinder	12 SWG	2·5 mm
G7/8	D.A. valves—cork for blanking W. Region type valves	3/4"	20 mm
G9/7	Axlebox/Axleguard clearances	1/2"	13 mm
G12/4	Weight of propane gas cylinder	40 lbs.	18 kg
	" " " charge	24 lbs.	11 kg
	Pressure of propane in cylinder	165 p.s.i.	11·4 bar
	" " " in use	14 inches water gauge	34·9 mbar
G13	Steam pipes—main	2"	50 mm
	auxiliary	1"	25 mm
B4/2 and G8/2	Air brake operating pressures.	50 p.s.i.	3.35 BAR
		60 p.s.i.	4 BAR
		72.5 p.s.i.	5 BAR
		78.5 p.s.i.	5.4 BAR
		85 p.s.i.	5.9 BAR
		105 p.s.i.	7.3 BAR

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