

VICTORIAN RAILWAYS

ROLLING STOCK BRANCH

BOOK OF
INSTRUCTIONS

H. E. DAW, Government Printer, Melbourne.

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Every employee to whom a copy of this book is issued must forthwith make himself thoroughly acquainted with, and will be held responsible for compliance with, the instructions contained herein.

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DISTRICT ROLLING STOCK SUPERINTENDENTS.

Every District Rolling Stock Superintendent must exercise a close, strict and constant supervision over the whole of the district under his charge and see that every Employe in his district is competent and performing his work efficiently.

Every District Rolling Stock Superintendent will, in addition to other matters prescribed in the Instructions contained in this book, be responsible for:—

- (a) The condition and maintenance in good order of all Locomotive Depots, Outstations, and Pumping Stations, and all machines, plant, and equipment associated therewith.
- (b) The proper maintenance of all locomotive and car and wagon stock in his district.
- (c) The supply of locomotives suitable to meet the demands of traffic when and where required.
- (d) The economic control of locomotive power, running and shed staffs, sufficient to meet traffic requirements.
- (e) The maintenance of an adequate supply of all necessary equipment, material and stores and for ensuring that surplus stock is not retained at Depots, and that no wastage of coal, oil, materials, and equipment occurs.
- (f) The proper observance by all employes of all Rules, Regulations, and Instructions.

He must frequently travel on locomotives, and note their condition. He must also carefully note the manner in which enginemen handle their engines, and if he considers any engineman deficient in knowledge or experience, he must take any action necessary in accordance with the circumstances.

He must promptly report to the Chief Mechanical Engineer any employe whom he considers inefficient or neglectful; and relieve from duty any employe guilty of

a serious dereliction of duty, and report the circumstances fully and promptly to the Chief Mechanical Engineer.

He must see that, when a locomotive requires an overhaul or repairs which cannot be effected at a Depot, full details of all necessary repairs are set out on Form R.S. 236A, and satisfy himself that such repairs are necessary, and promptly forward the R.S. 236A, together with his recommendation to the Chief Mechanical Engineer. On receipt of advice that a locomotive is to be sent to a Workshop, suitable arrangements must be made to ensure it arriving at the Workshop on the specified date.

If a vehicle requires repairs which cannot be effected at a Depot, is overdue for lifting, or requires re-painting, full reports are to be forwarded promptly to the Chief Mechanical Engineer.

He must make the necessary arrangements to ensure that he is immediately advised, both when at or away from his headquarters, of any accident, derailment, delay to a train or other unusual occurrence.

He must proceed as quickly as possible to the scene of any accident or derailment in his district, and make the necessary preliminary inquiries in conjunction with the senior officers present of the Way and Works and Transportation Branches, and take immediate steps to clear the line and replace the rolling stock.

When the locality of an accident can be reached more expeditiously by the District Rolling Stock Superintendent of an adjoining district, the latter must also proceed there as soon as possible, and promptly telegraph all particulars to the Chief Mechanical Engineer.

He must see that all meter readings of water supplied to the Department are sent in regularly and recorded by the Officer-in-Charge of each Depot in his district. He must also see that any marked variation in consumption is promptly reported to him by the

officer referred to, and immediately take steps to ascertain the cause of the variation, and submit a report in connection therewith to the Chief Mechanical Engineer.

Accounts for water supplied, with invoices attached, will be sent to him for certification, and, if correct, he must initial the invoices, giving the reasons for any abnormal increase or decrease in consumption.

He must allot the duties and supervise the work of any Enginemen Instructor attached to his district. The primary duty of an Enginemen Instructor is to travel with and instruct enginemen, and suitable arrangements are to be made to enable him to travel with any engineman who requires instruction, and also with drivers and firemen on their first trip after qualifying as such.

He must see that all records are satisfactorily kept and that all entries are properly made in the books kept in connection with the repair and examinations of rolling stock, and certify thereto.

He must notify the Chief Mechanical Engineer daily, before 10 a.m., his proposed movements during the day.

LOCOMOTIVE DEPOTS.

The Officer-in-Charge of a Locomotive Depot, will, in addition to other matters prescribed in the Instructions contained in this Book be responsible for:—

- (a) The proper and efficient management of the Depot, the regulating of the locomotive power and the staffs at the Depot and Outstations in his district to meet variations in traffic economically and effectively, and the observance of the Rules, Regulations, and Instructions, by all the employes under his control.
- (b) The inspection, examination, repair, and maintenance in good order of all locomotives and car and wagon stock under his control and also that which runs into his Depot or is attended to by any of his staff.

- (c) The delivery to the Transportation Branch at specified times of locomotives of the type and power ordered, thoroughly roadworthy and equipped for the service required and manned by crews qualified in roads and signals in the area of operation and competent to operate the locomotives in an efficient and economical manner. He must, as far as practicable, whilst he is on duty, personally see all enginemen before the departure and after the arrival of their trains, and satisfy himself that they are in a fit and proper condition for duty.

He must keep in touch with the local Transportation Officers in regard to the supply of locomotive power, and co-operate with them in order to obviate locomotives being prepared for service unnecessarily, or at an earlier time than that at which they will be actually required.

He must arrange for the posting of all special timetables, special train notices, departmental circulars, and other documents of importance, and for the attention of the employes being directed on the Shed Roster or Running Sheet to the existence of circulars received which affect the running of trains.

He must carefully peruse notices of special trains, and must so arrange that no Driver is allowed to proceed with any train unless he is furnished with a proper time-table of its running and special train notices applicable thereto, and has acknowledged the receipt thereof, in the book provided for that purpose.

He must keep in a book a record of all repairs executed at any time to any boiler or firebox, and must forward to the Chief Mechanical Engineer, through the District Rolling Stock Superintendent, not later than the 3rd of each month, a return (R.S. 252) showing the repairs effected to fireboxes and boilers during the preceding month, and by whom they were executed.

He must maintain a record of the washing out of boilers, cleaning of tubes and brick arches, and the re-oiling of all locomotives in his district. When it is necessary for the boiler of a locomotive to be washed out at a Depot other than at which it is stationed the Officer-in-Charge must notify the Depot concerned accordingly, and the Officer-in-Charge of the Depot at which the boiler was washed out must notify the Home Depot the date on which this was done.

He must immediately telephone or telegraph to the Superintendent of Locomotive Running particulars of any accident, derailment, injury to an employe or a passenger or other person, and any failure of a locomotive or serious delay to a train.

He must arrange to be advised promptly of any case of a train running unduly late, and if due to any cause within the control of this Branch ascertain the reason for the late running. He must advise the Superintendent of Locomotive Running not later than 9 a.m. each day particulars of all cases occurring during the previous day.

He must ensure that every train running debit against this Branch is thoroughly investigated, full reports obtained from all concerned, and each case finalized without delay.

Correspondence must be dealt with as directed in Section 3, pp. 25 to 27.

When a locomotive has been concerned in any accident, collision, or derailment the Depot Foreman must personally make a careful examination of the whole of the engine and tender including the gauging of the wheels, tyres, and axles. All defects and damage are to be carefully noted and recorded for reference purposes, and a full report forwarded to the District Rolling Stock Superintendent. If the accident be of a serious nature no repairs or adjustments are to be made, but the locomotive must be held in the Depot and the Chief Mechanical Engineer advised of the circumstances and the result of the examination.

Every Sub-Depot Foreman, Fitter-in-Charge, or Leading Hand Fitter must carefully peruse all entries made by Drivers on Repair Cards or in the Repair Report Book, and must enter, in the column provided for the purpose the name of the employe whom he instructs or intends to do the particular work, and must certify to work done during such hours as he is on duty. He must further satisfy himself that any work marked off as having been attended to during the period of his absence from duty is properly recorded on the Time Sheet of the employe concerned as well as on the Repair Card or in the Repair Report Book.

He must, in every instance in which work is recorded as requiring attention, and has not been completed, specify the reasons for the delay; and if such neglect be due to any omission on the part of an employe, he must bring such omission under the notice of the Officer-in-Charge and must, in addition, carry the entry forward so as to ensure the work receiving attention at the earliest opportunity.

If any defect is booked which he does not consider requires attention he must confer with the Officer-in-Charge, who will determine if any action is necessary, and if unnecessary or of such a character as not to impair the safety or efficiency of the locomotive for service, the reasons should be concisely stated in the column provided for "Details of work done," and any engine may, under such circumstances, be allowed to go into running.

Every Night Foreman and Chageman must peruse the entries on Repair Cards or in the Repair Report Book as soon as he commences duty, and frequently during the time he is in charge of the depot, and he must arrange to allot any work booked in the order of its importance, see that repairs attended to are properly recorded, and satisfy himself, before allowing any engine into traffic, that the work has been properly performed. He must also initial the entries of work done during the period he is in charge.

BRAKE INSPECTOR.

The Brake Inspector will be responsible, under the direction of the Superintendent of Locomotive Running, for the inspection of the brake equipment on all locomotives, cars, vans, and wagons in running in steam, electric, and petrol electric services, and at all Depots. He must exercise a close and constant supervision over the brake equipment to ensure that it is maintained in a thoroughly efficient condition.

He must see that the examinations of the brake equipment are regularly and systematically carried out, that all the records of such examinations are properly kept, and that all returns in connection therewith are forwarded monthly to the Chief Mechanical Engineer.

He must promptly report to the Chief Mechanical Engineer any neglect or inefficiency on the part of any employe responsible for the operating, repair, or examination of the brake equipment.

He must immediately proceed to the scene of every accident of a serious nature, and collect all necessary data.

He must frequently travel on locomotives and explain to enginemen the mechanism and proper manipulation of the Air brake. When at Depots he must, where necessary, instruct all employes whose duties are in any way connected with the maintenance of the Air brake equipment and satisfy himself that all concerned have full facilities and opportunities for making themselves acquainted with the equipment.

He must periodically visit all depots and inquire closely into the method of marking off vehicles for repairs and examination, see that the vehicles are properly recorded for attention, that such repairs and examination have been attended to, and where he considers that improvements are possible, confer with

the Depot Foreman of the district and report the conclusions arrived at to the Superintendent of Locomotive Running.

He must confer freely with District Rolling Stock Superintendents when in their districts, and advise them of all matters affecting the brake equipment which he considers require attention.

He must regularly and systematically examine all brake stock at Depots and must satisfy himself that the stock on hand is adequate, and of the types and sizes necessary for and not in excess of reasonable requirements.

Every Train Examiner or Undergear Repairer, before carrying out examinations, cleaning and lubricating of Triple Valves or any Air Brake apparatus must be certified as competent to do so by the Brake Inspector.

He must keep a diary recording his daily movements, and all matters noted as requiring attention. He must also notify the Chief Mechanical Engineer daily, before 10 a.m., his proposed movements during the day.

ENGINEMEN INSTRUCTORS.

The Principal duty of an Engineman Instructor is to instruct enginemen in the proper methods of preparing, stabling and operating locomotives and of handling trains.

He must give special attention to the instruction of new and inexperienced firemen and junior drivers and, as far as is possible, travel with each man on his first trip after qualifying in these grades.

He must frequently check up every engineman in his District and satisfy himself that each driver is fully conversant with the roads and signals in the area over which he is employed; that he has a good knowledge of all Rules and Regulations and Instructions, and that he is following sound practices in locomotive

working; that each fireman is thoroughly familiar with his duties and is carrying out his work in a proper manner. He must correct any irregular or improper practices and give any necessary instruction to ensure that every engineman is competent to carry out his duties.

He must, when opportunity offers, make a careful inspection of locomotives in service. Any defects observed must be reported in writing to the Depot Foreman or Fitter-in-Charge concerned, and also to his Superintendent.

He must act in conformity with the Rules, Regulations and Instructions, and with any directions issued to him by the Chief Mechanical Engineer, and see that employes carry out their duties in accordance with the Rules, Regulations and Instructions.

Each Engineman Instructor is under the immediate direction and control of the Rolling Stock Superintendent of the District to which he is attached, and it is incumbent on him to take an active interest in any matter within his province that he considers requires attention, and report to his Superintendent any suggestion concerning improved or more efficient methods of railway operations.

He must submit a weekly report covering his activities during each week, and in addition must promptly report any irregularities or any inefficiency, carelessness or neglect of duty on the part of any employe.

GENERAL.

1. Every permanent employe, and every supernumerary employe as the Chief Mechanical Engineer may direct, must be supplied with a copy of this Instruction Book and any Instruction as directed by the Chief Mechanical Engineer. Every Officer in charge of a Workshop or Depot will be held responsible for ensuring that the books are supplied as directed, are properly signed for, and that the receipts are sent to the Chief Mechanical Engineer.

2. Every employe issued with a copy of this Book must make himself thoroughly acquainted with and will be held responsible for compliance with the Instructions contained herein. Alterations or additions authorized from time to time must be neatly inserted by each employe to whom an amendment is issued.

3. Every Officer-in-Charge of a Workshop or Depot must arrange for the posting, on a proper notice board, of all instructions and notices which require to be so posted for the information of employes generally. Every employe at any Workshop or Depot must make himself thoroughly acquainted with and will be held responsible for compliance with all instructions and notices which are posted on a notice board and which concern him.

4. Every Officer-in-Charge of a Workshop or Depot will be responsible for the care and maintenance in good order of the Workshops, Running Sheds, Machines, Plant, and Equipment under his control, for the proper and efficient supervision of the staff, the economical disposition of all stores and material, and the observance of all Rules and Regulations and Instructions and any directions issued by the Chief Mechanical Engineer.

5. Every Officer-in-Charge must refuse admission to any unauthorized person, and report any disregard of this instruction.

6. An employe must not introduce any stranger into any Workshop or Depot without the permission of the Officer-in-Charge.

7. Any person, whether a candidate for a Parliamentary, Municipal, or other election, must not be permitted to canvass within any railway premises.

8. The hours of commencing and of ceasing duty of every Officer-in-Charge of a Workshop or Depot will be as prescribed by the Chief Mechanical Engineer.

9. Every Officer-in-Charge must see that each employe under him is in attendance during the specified working hours, that he is competent for the work he is set to do, and that all work is carried out properly and efficiently; he must arrange the duties of every employe under him, and pay special attention to the fair and even distribution of work, so that the working of overtime may be avoided, or if unavoidable, reduced to a minimum. He must promptly report to the Chief Mechanical Engineer any case of inferior workmanship, or carelessness, inattention, negligence, incompetence, or absence from duty.

10. Every Foreman, Sub-Foreman, Fitter-in-Charge, Leading Hand, or Employe-in-Charge, must at once report to his Superior Officer any case of inferior workmanship, carelessness, inattention, negligence, incompetence, or absence from duty of any employe under his supervision.

11. Every employe must be punctual in his attendance, promptly obey all orders of a superior, and must carry out in a regular and methodical way all work entrusted to him.

12. Every case of misconduct which may lead to an employe being punished, must be reported to the Chief Mechanical Engineer.

13. Any employe who has reason to believe that another employe is intoxicated, or under the influence of intoxicating liquor, or suffering from the effects of over-indulgence therein, or is bringing such liquor or causing it to be brought on to a locomotive or any railway premises, must immediately report the fact to his Officer-in-Charge, or the immediate Superior Officer in charge of the employe in question. The Officer-in-Charge must obtain corroborative evidence, if available, and, if such evidence justifies it, he must immediately relieve from duty the employe concerned, and report the matter to the Chief Mechanical Engineer, first obtaining a written report from all witnesses to the occurrence, and, if possible, a written explanation from the employe accused.

Any employe who may be at a station or depot where he cannot appeal to a Superior Officer of his own Branch, and who may be reporting such an offence, must direct the attention of officers of other Branches or some other person or persons to the matter, so that corroborative evidence may be obtained, and must report the occurrence to his immediate Superior Officer at the earliest opportunity.

14. Every Officer-in-Charge must, in all cases where any employe reports for duty at other than his Home Station, and is regarded as being unfit for duty through over-indulgence in intoxicating liquor, relieve the employe from duty and instruct him verbally and in writing to report personally to the Officer-in-Charge the following day at a specified time. The employe must not be returned to his Home Station as Passenger unless the Officer-in-Charge is satisfied that it is safe for him to travel, and that his condition will not create annoyance to other passengers.

15. Any employe who has been suspended from duty for any offence must not be permitted to resume without the sanction of the Chief Mechanical Engineer.

16. Gambling, bookmaking, or the promotion of a sweep by an employe on railway premises is strictly prohibited.

17. Every employe is prohibited from smoking at any time in or near any Carriage, Wagon, Pattern, or Tarpaulin Shop, Sawmill, Timber or other Store, in the vicinity of any Timber Stack, in any vehicle under or awaiting repair, or in any place where it is likely to cause risk of fire.

18. An employe must not occupy a portable house or other Departmental premises without permission.

19. Every employe not entitled to free quarters, and who occupies a Departmental residence, must sign an agreement and pay rent and all rates and taxes. On vacating the premises, the employe concerned must give written notification to the Chief Mechanical Engineer, through the Officer-in-Charge, and hand the keys over to the Ganger; otherwise he will be liable for the rental and other charges up to the date on which the matter is brought under notice.

20. Every employe who is required to do so must prepare and sign a time sheet showing in detail the time worked on every job, and hand it to his Officer-in-Charge, who must carefully check the time sheets of the employes under his control and, if correct, counter-sign each sheet.

21. An employe must not make any false entry or alter or erase any entry in any time book, time sheet, attendance book record, or running sheet.

22. An employe is not permitted to work a shift for, or change shifts with, another employe without having obtained the permission of the Officer-in-Charge, who must not agree to any change which would involve excessive hours of duty, inadequate period off duty for rest, or which would, in any other respect, infringe any Award governing working conditions. The name of the employe actually working the shift must be shown on the time sheet, and not the name of the employe for whom the shift is worked.

23. (a) Any employe who reports for duty 15 minutes or less after the prescribed time for commencing duty will be regarded as having arrived 15 minutes late, and any employe who reports more than 15 minutes late, and less than 30 minutes late, will be regarded as having arrived 30 minutes late. Any employe reporting for duty more than 30 minutes after commencing time in the morning will not be allowed to start until midday, except at the discretion of the Officer-in-Charge.

(b) Any employe who reports for duty 15 minutes or less after the prescribed time for commencing work after the meal hour will be regarded as being 15 minutes late, but any employe more than 15 minutes late will not be permitted to start unless specially authorized by the Officer-in-Charge, and any such absence will be regarded as absence without leave. Any employe habitually losing time will be punished.

24. (a) Every employe supplied with a metal token bearing the number allotted to him must take his token up before commencing work, and deposit it in the proper place when leaving. Any employe who loses his token, allows it to be become defaced, proceeds to his work without taking it up, does not deposit it on leaving, or takes up or deposits more than one token will be punished.

(b) Every employe in a shop where a time clock is installed must, before commencing work, press the bell-punch on the clock on the number allotted him, and he must do the same on leaving work. Any employe who punches the wrong number on a time clock, punches on or off or attempts to punch on or off for another employe, will be punished.

25. An employe must not, without permission, leave duty at other than the appointed time. Any employe who obtains leave of absence must hand his token to the Timekeeper, or record his time of ceasing duty on the time clock, where such is provided. In all cases

he must, when leaving, report personally to the Time-keeper who must note the time of departure, and must obtain from the Officer-in-Charge a docket certifying that the employe was granted leave.

26. Every employe must enter and leave his working location through the proper entrance and exit, and every employe who journeys by train must enter and leave Railway station platforms by the public entrance or exit.

27. An employe must not during working hours enter any workshop other than that in which he is employed unless on Departmental business.

28. An employe must not remain in or return to any workshop after working hours without the permission of his Officer-in-Charge.

29. An Officer-in-Charge must not issue a certificate of character or furnish a report on the value of work done to any past or present employe or contractor, except with the written authority of the Chief Mechanical Engineer.

30. Work must not be undertaken for any other Branch or anyone outside the Department without the authority of the Chief Mechanical Engineer.

31. An employe must not open another's drawer, box, cupboard, or locker, or take any tools belonging to a fellow employe, without his leave, unless directed to do so by his Officer-in-Charge, and in the latter's presence.

32. Every employe in charge of a Tool-making Shop, or Tool Store must keep an accurate record of all tools in the store. He will be held responsible for their safety, branding and condition, and he must report to his Officer-in-Charge any case of damage which is

not due to fair wear and tear. The name of every employe obtaining a tool, or returning it, must be recorded with the date of its issue and return. If any tool is not punctually returned, he must communicate at once with the Officer-in-Charge of the employe who retained it, and he must see that the whole of the tools are returned to the Tool Store at the end of each week.

33. Every employe obtaining a tool from a store, must give his name, with the particular description and size of the tool he requires, to the person in charge, so that it may be entered against him. He must also return the tool within a reasonable time, and repeat his name, etc., as on taking it out, so that the debit may be written off.

34. Every air jack must have the piston withdrawn and examined every twelve (12) months, and at the same time the leather must be cleaned and oiled before being replaced.

When an air jack is being examined or repaired, the rubber air pipe between the air jack and the air supply must be disconnected before anything is done to the air jack. This will prevent the supply of air to the jack whilst any employe is engaged on it, and so obviate an accident.

35. Every Crane rope, Crane chain, rope, sling, chain sling, and other rope and/or chain tackle used for lifting purposes, must be carefully examined every Monday morning, by the Officer-in-Charge, or an employe appointed by him to see that they are sound and fit for use. Before using them every employe concerned must also examine them and satisfy himself that they are in good order and perfectly safe for the weight to be handled.

36. Every employe who accidentally breaks or otherwise injures a tool or spoils material and neglects to inform his Officer-in-Charge thereof, or who carelessly

or wilfully destroys or loses any tool or other article, or defaces or alters any drawing or pattern, must make good the loss or damage or be dealt with in such other manner as the Chief Mechanical Engineer may direct. If the tool forms part of the kit of an engine it must be replaced at once.

37. An employe must not, upon any pretence, nor for other than Departmental purposes, take from any railway premises any Departmental property, nor convert to his own use any material or article which is the property of the Department. The making of any tool, pattern, model, or other article by any employe upon railway premises for private purposes is prohibited.

38. Every employe having occasion to take tools or material from a Workshop or Depot to any place where he may be temporarily employed, must obtain a written permit from his Officer-in-Charge, and hand it to the Storeman, who must check the articles before they are taken off the premises. Such tools and any surplus material must be returned to the Workshop or Depot through the Storeman.

39. Any tool, appliance, or material of any description belonging to the Department, must not be sold, loaned or borrowed, or removed from any Workshop or Depot without the authority of the Chief Mechanical Engineer.

40. An employe must not bring into any Workshop or Depot any material or goods of any description other than tools which are required for his work.

41. Every Officer-in-Charge of a Workshop or Depot must make suitable arrangements to provide for the reclamation of scrap bearing metals as set out in the following instructions:—

(a) In order to obtain successful reclamation it is *most important* that the various run out

metals and borings be kept separate to prevent contamination; this is particularly the case with C.A.T. B.19 scrap and mixed borings, which are very seriously contaminated by the presence of J.B.L. B.17, M.P. B.16 or aluminium.

(b) All scrap bearing metals shall be forwarded to the Reclamation Depot, Spotswood. Each container shall have a label attached showing the name of the despatching store and the nature of the contents. Under no circumstances shall rubbish be placed in the scrap metal containers.

(c) In addition to the bearing metal scrap listed above, other non-ferrous scrap shall be similarly separated for despatch to the Reclamation Depot, Spotswood.

42. An employe other than a certified Engine-driver, must not be permitted to take charge of a locomotive or steam crane, under steam, unless examined and certified as competent to do so by the Workshop Manager, Assistant Workshop Manager, Superintendent of Locomotive Running, a District Rolling Stock Superintendent, or in special emergency an Officer-in-Charge of a Depot. In each case a certificate must be forwarded to the Chief Mechanical Engineer by the Officer concerned, setting out the date of the examination.

43. Every Officer-in-Charge must see that repairs to any vehicle are not undertaken outside the Yard of a Workshop or Depot unless such vehicle and the men repairing it are properly protected in accordance with instructions contained in the General Appendix.

44. When shunting in and about any Workshop the speed of the engine must not exceed 4 m.p.h., the whistle must be frequently sounded, and all vehicles being

shunted must be coupled on to the engine. A sharp look-out must always be kept as a precaution against accidents, and care must be taken to see that the following instructions are observed:—

- (a) The operations of every loco. steam crane or shunting engine will be under the direction of a Yard Foreman or Shunter-in-Charge, but the actual movements of the crane, or engine, when vehicles are attached, must be made in obedience to the signals of the Shunter-in-Charge.
- (b) Before any shunt is performed on a line leading into a shop, the doors of the shop must be opened, and they must be kept open during the shunting operations, in order to guard against accidents.
- (c) When an engine or a loco-crane is proceeding into or out of a shop, the speed must not exceed 4 miles per hour, one Shunter must enter the shop ahead of the engine, to see that the road is clear, while the other must remain at the entrance to prevent any one crossing in front of the engine while in motion, and also to give and receive the necessary signals. The engine must be brought to a standstill, about one length from the vehicle to be shifted. The Shunter-in-Charge must see that all workmen are clear, and ascertain from the Officer-in-Charge that everything is right before moving the vehicle.
- (d) Slip, fly, or kick shunting is strictly prohibited on roads leading through or alongside any Workshop, and all vehicles on those roads must be placed in position while attached to the engine.

AMENDMENT TO ROLLING STOCK BRANCH
BOOK OF INSTRUCTIONS :—

To be inserted as Clause 44A on page 24 of the Book of Instructions and on page 11 of the Pamphlet as Clause 35A (* Delete number not applicable)

44A/~~35A~~. * Shunting of wagons or vehicles by the use of mobile road crane or road tractor is permissible at workshops under the following conditions :

- (a) The mobile crane or tractor must be operated by a qualified driver, *i.e.*, one who is licensed to drive a road motor vehicle and has been certified to by a departmental officer as competent to operate a mobile crane or tractor, and be assisted by an employe who has been instructed and certified as competent to undertake the movement of vehicles, including the use of chains and slings ;
- (b) Movement of wagon or vehicle may be carried out by pushing or hauling with tow rope ;
- (c) The wagon or vehicle may be pushed or hauled with tow rope on to turntable to permit transverse movement of such wagon or vehicle ;
- (d) The speed of any such movement of wagon or vehicle must not exceed approximately 2 miles per hour ;
- (e) Before undertaking the movement of any vehicle the driver and assistant must see that all workmen are clear ;
- (f) Clearing, placing and spacing wagons in the lift and repair shop may also be undertaken by mobile road crane or road tractor.

CORRESPONDENCE.

48. Official correspondence must be regarded as confidential.

49. All correspondence must be returned promptly. If any delay occur, the cause must be explained. Correspondence must be kept and returned in a clean condition. When the Chief Mechanical Engineer minutes a Secretary's paper to one of his subordinate Officers, that Officer's reply must, if practicable, be written on the same sheet. Endorsements must not be made on Secretary's papers.

50. In replying to any communication, either by telegraph or otherwise, the following instructions must be observed:—

- (a) Read the communication carefully to ascertain clearly the nature of the information required;
- (b) Frame the reply so that it will run as closely as possible in the same paragraph order as the communication to which it refers;
- (c) Supplement the reply with any information which may be considered of value or interest.

51. Every Depot Foreman or Officer-in-Charge, before forwarding correspondence relative to "Train Delays," must see that full reports from all concerned are attached. He must closely scrutinize them in order to ascertain the cause of the delay, and supply full information as to the defect or defects which caused it, and any other necessary particulars bearing on the case to permit of the prompt finalizing of the matter.

52. Every employe must send *all* correspondence through his immediate Superior Officer, who must see that all necessary information is given. An employe must not correspond with another Branch except through the Chief Mechanical Engineer, subject to the reservation that District Rolling Stock Superintendents and Depot Foremen may communicate with Officers of other Branches on minor matters of purely local railway business.

53. (a) Every letter or parcel containing any of the undermentioned articles must be forwarded as a "Value" consignment enclosed in a "Value" envelope or having such an envelope affixed to it.

Cash—Departmental Watches.

Pay Cheques—Book Duty Passes.

Time Books.

Metal Tubes containing running shed examination records.

Every employe, when consigning any of the above articles, must keep a record of the article consigned, the date and name of the consignee, and obtain a receipt from the Transportation employe taking delivery of each consignment.

(b) Every letter or parcel containing any of the undermentioned articles must be forwarded as an "Important" consignment enclosed in an "Important" envelope or having such an envelope affixed to it.

Receipted Pay Rolls.

Accounts.

Time Sheets.

Papers or correspondence that the Chief Mechanical Engineer may direct be treated as "Important."

A description of the contents of the letter or parcel must be shown on the face of the envelope, and if an Officer-in-Charge deems it necessary, a receipt may be obtained from the Transportation employe who takes delivery.

54. Telephone messages relating to the working of engines or of trains, or to a demand for and supply of material or equipment and other messages of importance must be recorded in the telephone book with the initials of the employe who sends the message, as well as the initials of the employe who receives it. The receiver must repeat the message from his written copy, and the sender must see that it has been accurately repeated.

55. Every inquiry made by telegraph must be answered in a similar manner in the absence of instructions to the contrary. The fullest use must be made of the Telegraph Code.

56. Every communication referring to Departmental business which is received from a person outside the Railway Service must be referred to the Chief Mechanical Engineer, together with any necessary information, and the writer must be notified that such action has been taken.

57. No liability will be incurred by the Railway Department with regard to the delivery or non-delivery of any private letter addressed to an employe at a Workshop or Depot.

58. Any employe, after furnishing a report and explanation of any offence with which he is charged or who has been punished for an offence may, if he so desire, be permitted to peruse and take copies of the relevant reports in the presence of the Officer-in-Charge or his Deputy, but must not be allowed to take the reports out of Departmental custody.

**INJURIES TO AND ILLNESS TO EMPLOYEES—
LEAVE—PASSES.**

59. Every employe who is injured in the active discharge of his duty must submit a detailed report on the prescribed form (G. 3) to his Superior Officer before leaving the railway premises if his condition permits, or otherwise as soon thereafter as circumstances will admit. Failure to do so may render an employe liable to be debarred from participation in accident pay.

60. In any case in which an employe of another Branch, while on duty, meets with an accident causing him injury, and such accident is witnessed by an employe of this Branch, the latter must at once report the fact to his superior officer giving full information as to the manner in which the accident occurred. In country districts the Officer-in-Charge must forward such report to the District R.S. Superintendent for submission to the District Superintendent; while in the Metropolitan Area the report is to be submitted to the Chief Mechanical Engineer for transmission to the Head of the Branch concerned. This instruction must receive special attention to obviate delay in the finalization of accident pay.

61. Every employe injured in the active discharge of his duties is liable to be called upon to perform suitable light duty if in the opinion of the Railways Medical Officer the injuries are of such a nature as to permit of the performance of such duty. Every Officer-in-Charge must pay particular attention to this direction, and if any employe declines to undertake the light work offered, the facts must be at once reported by telephone or telegraph to the Chief Mechanical Engineer.

62. (a) Any employe who is incapacitated for duty through illness shall so advise his supervising officer on the first day of absence from duty in sufficient time to admit of arrangements being made for the performance of his duties, and any such employe who fails to do so may be treated as absent without leave.

**AMENDMENT TO ROLLING STOCK BRANCH
BOOK OF INSTRUCTION—To be inserted on
page 29 of the Book of Instructions and on page
18 of the pamphlet. (Reprint of the respective
pages).**

Any employe so incapacitated for duty shall also notify his supervising officer of the date on which he will be able to resume duty in sufficient time to enable any necessary arrangements to be made.

(b) Every officer or employe absent from duty through illness or injury must comply with the special instructions contained in Division 14 of Regulation No. 76 (Wages, Conditions, etc.), or Regulations and/or Instructions governing sick pay to daily paid employes, which are briefly as follow:—

Every Officer who is incapacitated for duty through illness or injury must furnish a medical certificate on the prescribed form not later than the third day of his absence.

Every employe incapacitated for duty through injury sustained whilst on duty must furnish a medical certificate on the prescribed form not later than the second day of his absence.

Regulations governing the absence of employes owing to illness in respect of which **payment from sick leave credits is involved**:—

Any employe who has been continuously employed for a period of not less than two years, and is incapacitated for duty in consequence of illness and whose absence is prolonged beyond two days, shall forward to his supervising officer not later than the third day a medical certificate.

Any officer or employe who finds that he will be unable to resume duty on the expiration of the period shown on the medical certificate first submitted by him shall,

unless otherwise directed, thereupon furnish a further certificate, and shall continue to furnish further certificates upon the expiration of the periods respectively covered by such certificates, provided, however, that the maximum period between the dates of furnishing any two certificates shall be fourteen days.

Instructions governing the absence of employes owing to illness in respect of which **payment from sick leave credits is not involved** :—

Every employe who is incapacitated for duty through illness must furnish a medical certificate on the prescribed form, or a form G. 215 not later than the fourth day of his absence.

Where form G. 215 is submitted and the period of absence extends to fourteen days or more a medical certificate must be furnished not later than the fourteenth day of absence.

In the event of prolonged absence due to ill-health, employes must furnish medical certificates at intervals of 28 days from the date of ceasing duty.

In the case of absences not covered by a medical certificate where doubt exists as to the genuineness of the case, an employe may be required to produce a medical certificate covering the period of absence.

Any employe so incapacitated for duty shall also notify his supervising officer of the date on which he will be able to resume duty in sufficient time to enable any necessary arrangements to be made.

(b) Every Officer or Employe absent from duty through illness or injury must comply with the special instructions contained in Division 14 of Regulation No. 76 (Wages, Conditions, &c.), or Regulations governing sick pay to daily paid employes, which are briefly as follow:—

Every Officer who is incapacitated for duty through illness or injury, and every employe incapacitated for duty through injury sustained whilst on duty, must furnish a medical certificate on the prescribed form on the third day of his absence.

Any employe who has been continuously employed for a period of not less than two years, and is incapacitated for duty in consequence of illness and whose absence is prolonged beyond two days, shall forward to his supervising officer not later than the third day a medical certificate.

Any officer or employe who finds that he will be unable to resume duty on the expiration of the period shown on the medical certificate first submitted by him shall, unless otherwise directed, thereupon furnish a further certificate, and shall continue to furnish further certificates upon the expiration of the periods respectively covered by such certificates, provided, however, that the maximum period between the dates of furnishing any two certificates shall be fourteen days.

Every employe with less than two years' service who is incapacitated for duty through illness must furnish a medical certificate, on the prescribed form, not later than the fourteenth day of his absence, and must thereafter furnish a medical certificate at intervals of 28 days from the date of ceasing duty.

No employe shall be required to furnish a medical certificate in respect of any period—

- (a) in which he is an in-patient at a hospital, or
- (b) which is covered by a certificate of the Railways Medical Officer or a Government Medical Officer.

The date of every medical certificate and such other items as are indicated on the prescribed form shall be filled in by the medical practitioner, by whom any alteration in such particulars on the certificate shall be initialed.

Any employe in receipt of sick pay, who leaves his usual place of residence for more than three days, shall notify his supervising officer of the address or addresses at which he may be found from time to time.

63. Every employe engaged in the running of trains or attached to a locomotive depot must give to the Officer-in-Charge not less than four hours' notice of his intention to absent himself from duty, or if he is to be called he must have a memo. ready for the caller-up to convey to the Officer-in-Charge.

Every employe who does not give notice as prescribed herein or is not notified that leave has been granted will be treated as being absent without leave in the event of his not reporting for duty.

64. Every employe who has been absent on sick leave, or without leave, must report personally to the Officer-in-Charge before he will be permitted to resume duty, and he must not be allowed to start work unless the Officer-in-Charge is fully satisfied that he is fit to do so.

65. An Officer-in-Charge may grant leave without pay for two days to any employe, but must not grant leave beyond that period unless authorised by the Chief Mechanical Engineer.

66. A leave pass will not be issued to an employe, extended or altered, except by a written request (or a telegram in case of emergency) which must be certified to by the Officer-in-Charge.

67. Every employe must surrender his leave pass at the expiration of the period for which issued, and any duty or transfer pass immediately he has completed the duty or transfer for which the pass was issued. If a pass has not been collected at a station or by the Checking Staff it must be handed to the Officer-in-Charge who must promptly forward it to the Chief Mechanical Engineer.

68. Every employe who loses any pass issued to him, either for himself or for some member of his family, must promptly report such loss to his Officer-in-Charge with details of any action taken by him to recover the pass.

69. Every employe to whom a card pass is issued in order that he may attend classes at the Victorian Railways Institute, the Victorian Railways Technical College, or other approved Technical Schools, or other purposes approved by the Chief Mechanical Engineer must take special care to see that the pass is certified to by the Station-master on the forward journey, and by the Instructor-in-Charge on the return journey. Neglect of this regulation will be seriously regarded. A Pass which has expired must be handed to the Officer-in-Charge, by whom it will be forwarded to the Chief Mechanical Engineer for inspection. When applying for a new pass every employe must see that the application is lodged in sufficient time to allow of a fresh pass being issued before the old one expires.

70. An employe on being transferred from a Depot or Workshop to another Depot or Workshop must be supplied by the Timekeeper with a memo. to hand to the Officer-in-Charge of the Depot or Workshop to which he is transferred, giving the date of transfer and the train by which he has been instructed to travel, and the time he is instructed to report for duty.

When any employe is temporarily transferred he will be under the supervision of the Officer-in-Charge at his temporary location.

FIRE PREVENTION.

71. Every Officer-in-Charge of a Workshop or Depot must see that the following Instructions with regard to the prevention and extinction of Fires are strictly observed, and he will be held responsible for the Fire appliances under his charge being maintained in an efficient condition.

72. Every Fire bucket must always be kept filled with water, and in its proper place ready for use.

73. Rubbish must be burnt only in approved locations. An employe must not take a portable fire into the places enumerated in Instruction 17. When it is necessary for him in the performance of his duties to have a fire in the vicinity of such places, it must be lighted in a portable rivet forge or in a fire pot, and placed in the safest position that can be found, away from all buildings and from any inflammable material; an employe must be in constant attendance whilst the fire is being used, and he must properly extinguish it before leaving work.

74. The fire of every stationary boiler must be thoroughly extinguished when not in use, and all live ashes must be properly quenched with water. While the boiler is working every care must be taken to prevent sparks, and any inflammable material must be kept away from the vicinity of the boiler.

75. Every blacksmith's fire must be very carefully watched to prevent sparks from arising, and the fire must be thoroughly extinguished when ceasing work each day.

76. Every Blacksmith must see that the air valve on his fire is closed when the air blast is stopped in order to prevent gases getting into the air pipes.

The relief valve at each end of the air blast pipe must not be closed for a period of at least 3 minutes after the air enters the pipe.

77. Every locker containing benzine, turpentine or other inflammable material must be examined once a month, or more often if necessary, by the Officer-in-Charge, and in the event of any being found to contain an accumulation of such material or of saturated waste, the employe responsible therefor will be liable to severe punishment.

78. Candles or other open lights or lamps must not be used in connection with the building or repairing of cars.

79. Every employe engaged repairing gas or water fittings in any car or shop must take every precaution to prevent fires arising from the materials, lamps or tools used.

80. Every employe must see that as far as possible when repairing an engine or vehicle, or when laying down material, that the work or material does not foul or block any road or siding, and that full access can be obtained to the fire appliances.

81. A locomotive or steam crane must not be taken into any Timber Store, or the Truck Shops at North Melbourne (Nos. 14 to 17 Roads); every vehicle must be hand-shunted into or out of such buildings.

82. Every Driver engaged in shunting at any Workshop or Car Shed, must avoid standing with the engine funnel under the sprinklers, otherwise the hot gases from the funnel may bring them into operation.

83. Rubbish, such as shavings, greasy waste, or other inflammable material, must not be allowed to accumulate in the shops, but must be collected each day and taken, before ceasing work, to the engine rooms or other special furnace to be burnt. Inflammable material must not be deposited on any rubbish tip.

84. Lighting-up wood or other inflammable material must not on any account be placed on the crown of a furnace or boiler.

85. Every Train Examiner, Running Gear Repairer, or other employe engaged on repairs to vehicles at the North Melbourne Workshops, or at Country Depots must, as far as possible, avoid leaving them in such a condition as to prevent them being moved, and all draw-gear removed must be replaced before ceasing work each day.

86. When a fire is discovered one man (where a Fire Alarm is provided) must ring it at once, a second man must (if necessary) send for locomotives to remove the Rolling Stock to a place of safety, but employes must hand-shunt any that may be in immediate danger, whilst others must make every endeavour to extinguish the fire by means of the fire buckets, hoses, and fire extinguishers.

PRACTICE CARDS.

87. (a) Practice Cards covering the Painting of Car and Van Stock, Method of Detecting Cracks and Flaws, Bearing Metal, and the materials to be used, method of manufacture, erecting, fitting, examination, and maintenance of certain locomotive parts have been issued. From time to time Practice Cards covering other items will be issued, and also amendments to existing Practice Cards.

(b) Every Officer-in-Charge of a Workshop or Depot will be responsible for seeing that all employes concerned strictly observe the instructions contained in the Practice Cards.

(c) Every employe to whom these Cards are issued must make himself thoroughly conversant with the instructions contained therein, and will be held responsible for compliance with these instructions.

(d) He must insert amendments as they are issued, and maintain a complete series of these Cards in good order and available for ready reference.

(e) Practice Cards which have been issued are shown hereunder. As further issues are made they are to be added to this list.

No.	Subject.	Date of Latest Issue.
F.18	Painting of Car and Van Stock ..	10.11.36
F.21	Car, Van, Wagon, Street Car, Rail Motor, and Electric Locomotive Wheels and Axles	12.8.41
G.1	Cracks and Flaws—Method of Detecting Superheaters	21.10.32
L/6.1	Bearing Metal	25.10.40
L/14	Tyre Retaining Rings	9.1.36
L.15	Engine, Tender, and Crane wheels and axles	16.5.39
L.15.1	Locomotive Axle Boxes, Coupled wheels Bushes and Pins for General work ..	11.7.38
L.15.2	Air Compressors for Steam Locomotives	26.5.39
L.16	Air Compressor Governors—Steam Service	15.10.31
L.16.1	Air Reservoirs for Locomotives ..	13.8.40
L.16.2	Brake Cylinders for Steam Locomotives	4.2.38
L.16.3	Sand Gear for Locomotives	10.1.38
L.16.6	Delta Type Trailing Trucks	7.2.38
L.17.1	Laminated Springs	9.2.38
L.18.3	Cylinders and Cylinder Bushing ..	29.3.38
L.19.1	Pistons and Piston Rings	25.1.38
L.23	Piston Rods, Nuts and Tail Rod Bushes	22.11.34
L.24.1	Crossheads, Gudgeon Pins, and Cotters	20.3.31
L.24.2	Slide Bars	29.7.33
L.24.3	Connecting Rods	7.6.32
L.24.4	Coupling Rods	19.12.40
L.24.5	Coupling Rod Knuckle Joints	15.5.39
L.24.6	Coupling Rod Knuckle Joints, with new type Parallel Pins	11.11.32
L.24.7	Hollow Piston Valves and Bushes ..	1.5.31
L.24.7A	Schmidt Piston Valves and Bushes ..	7.12.36
L.25.1	Motion Bushes and Pins	18.11.32
L.25.2	Precision Power Reverse Gear	3.11.32
L.25.4	Eccentric Sheaves and Straps	14.12.31
L.25.5	Bye Pass Valves	29.9.39
L.25.7	Ashpans	15.10.40
L.26	Ramsbottom Safety Valves	24.4.41
L.30.3	Coale Safety Valve	6.11.41
L.32.1	Spark Arresters	17.1.35
L.32.2	Blast Pipe and Chimney Alignment ..	27.12.41
L.35.1		30.10.41
L.35.2		4.8.33

LOCOMOTIVES.

88. When a locomotive requires repairs which cannot be effected at a Depot, the Depot Foreman must set out on Form R.S. 236A full details of all necessary repairs and forward such form to the District R.S. Superintendent, who must submit the form, together with his recommendation, to the Chief Mechanical Engineer. A locomotive must not be sent into any Workshop until a direction to do so is received from the Chief Mechanical Engineer. Arrangements must then be made to ensure that the locomotive concerned will arrive at the Workshops on the date directed by the Chief Mechanical Engineer.

89. When a locomotive is being despatched from a Workshop after overhaul a "C" form and a copy of it will be forwarded to the Officer-in-Charge of the Depot to which the engine is sent. He must retain the "C" form marked duplicate, note the original, and return it to the Chief Mechanical Engineer. Should the locomotive be transferred to another Depot, he must forward the duplicate "C" form to and obtain a receipt from the Officer-in-Charge of the Depot to which the locomotive is sent.

The Officer-in-Charge must promptly apply for the form or forms if he does not receive them, but their non-receipt will not relieve him of any responsibility as regards any locomotive under his charge.

90. Every new locomotive, and every locomotive which has been overhauled at a Workshop must be handed over to the Officer-in-Charge of the Depot to which the locomotive has been transferred, with complete equipment and enginemen's kit, as shown hereunder. Each article is to be branded with the number of the engine to which it is supplied.

LOCOMOTIVE EQUIPMENT.

- 4 Oil head lamps.—Locomotives without electric light.
 1 Oil head lamp.—Locomotives with electric light.
 2 Screw jacks
 2 Screw jack bars
 2 Ratchets
 2 Deals for screw jacks } Garrett and NA class locomotives only.
 1 Spark arrester brush.—Locomotives not fitted with self-cleaning smokeboxes.
 1 Valve spindle clip.—“S” class centre valve only.
 2 Crank pin bushes.—Locomotives with Stephenson valve gear.
 2 Crank pin clips.—Locomotives with Walschaert valve gear.
 1 Slide hook.—Locomotives with non-hopper ashpans.
 2 Pony packing blocks.—C, K, N, and X classes.
 2 Bogie packing blocks.—H and S class.
 1 Spanner for crank pin nuts.—All locomotives except H and S class.
 1 Motion bar clip.—All locomotives except H class.

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| 2 Prickers. | 2 Piston chock clips. |
| 1 Pinch bar. | 1 Spring clip. |
| 1 Drag chain. | 2 Cotter drifts. |
| 1 Double hook chain. | 1 Key drift. |
| 1 Flogging hammer. | 1 Pin punch. |
| 1 Chisel bar. | 1 Spanner $\frac{5}{8}$ ". |
| 1 Tommy bar. | 1 Spanner 1". |
| 2 Red flags with handles. | 1 Spanner $1\frac{1}{8}$ ". |
| 1 Box fog signals. | 1 Spanner $1\frac{1}{4}$ ". |
| 1 piece tarred rope 12' long. | 1 Ring spanner for gudgeon nuts. |
| 4 Pieces axle box packing. | 1 Ring spanner for big end nuts. |
| 4 Wooden wedges. | Assorted split pins, split cotters, nuts and washers. |
| 1 Piston chock. | |

ENGINEMEN'S KIT.

1 Bannister brush.	1 16" Shifting spanner.
1 Hand lamp.	1 Spanner $\frac{3}{32}$ " and $\frac{1}{2}$ ".
1 Bucket.	1 Spanner $\frac{3}{32}$ " and $\frac{3}{4}$ ".
1 Shovel.	1 Spanner $\frac{3}{4}$ " gland and C.
1 Hand hammer.	1 Spanner for oil caps.
2 Slush lamps.	1 $\frac{1}{4}$ " Pin punch.
1 Oil feeder.	1 Split pin hook.
1 Spare oil kettle.	1 Flat chisel.
1 Trimming box.	1 Packing drawer.
3 Gauge lamps	.. } Locomotives with oil lights.
1 Red shade	.. }
4 $\frac{3}{8}$ " burners	.. }
1 Grid tool ..	.. Locomotives with self-cleaning smokeboxes.

91. The above kit and equipment must be maintained complete and in good order on every locomotive in service.

92. When a locomotive is transferred from one Workshop or Depot to another Workshop or Depot, either permanently or on loan, the Officer-in-Charge must see before its departure that the equipment and enginemen's kit are checked and signed for by the driver in charge of the locomotive; the Officer-in-Charge of the Depot receiving the locomotive must have the equipment carefully checked and if any item is missing, immediate application therefor must be made to the Officer-in-Charge of the Depot from which such locomotive was transferred.

93. Every Officer-in-Charge of a Depot must see that the equipment and enginemen's kit of every locomotive are examined periodically without notice, and any Driver found in charge of a locomotive short of the full complement of tools, or having tools belonging to another locomotive, must be called on for an explanation which must be forwarded to the Chief Mechanical Engineer.

94. Every new locomotive and every locomotive which has received an overhaul is to be booked on light running until such time as all bearings have been properly tested.

95. When a locomotive is received from a Workshop or Depot after repairs, or transferred from another Depot, the Officer-in-Charge must examine and test it carefully and report promptly any defect in either workmanship or material. The Officer-in-Charge will be held responsible for any defect which he fails to report.

96. Employes concerned in the overhaul, examination, or repair of locomotives must exercise the greatest care to see that no part of the gear or any foreign article is left in the boiler, steam or exhaust pipes, cylinders, valve chambers or steam passages. When reassembling the gear a careful examination must be made of these parts to see that all gear such as tools, nuts, bolts, etc., has been removed. In the event of any gear being missed, the Fitter doing the work with which this gear is associated must immediately report the matter to his Supervising Officer. A thorough search must be made to locate the missing item. If it cannot be found, the portion of the engine mechanism concerned must be dismantled, and the Supervising Officers must satisfy themselves that it has not been left in any internal part of the locomotive.

BOILERS.

97. Every new locomotive boiler, before being put into use, must be thoroughly examined and tested with warm water to 25 per cent. above working pressure, and a certificate that this has been done, and that the boiler is satisfactory must be signed by the Workshops Manager and the Foreman Boilermaker, Newport, and forwarded to the Chief Mechanical Engineer. Certificates signed by the Workshops Managers at Ballarat and Bendigo, must be countersigned by the Workshops Manager, Newport. After a boiler has been tested with

warm water it shall be steam tested at the working pressure for three hours and then allowed to cool down after which it shall be again steam tested at the working pressure for three hours. In every case where a locomotive has been in the Workshop for general overhaul or for repairs which require a boiler test to prove the effectiveness of any such repairs, the boiler and firebox must be thoroughly examined inside and outside as far as practicable, and afterwards tested with warm water to 25 per cent. above working pressure, such examination and test to be recorded and the result together with the details of any repairs executed entered on a "D" Certificate, which must be signed by the Workshops Manager concerned and the Foreman Boilermaker, Newport, and forwarded to the Chief Mechanical Engineer.

When any patches have been applied to the firebox the boiler shall be steam tested at the working pressure to prove the work.

98. Every locomotive boiler except those with steel tubes must have the tubes withdrawn, and the boiler and the firebox thoroughly examined by the Workshops Manager concerned, and the Foreman Boilermaker, Newport, at the intervals and under the conditions set out hereunder:—

- (a) The first examination must be made when the locomotive has run 230,000 locomotive miles, or when a period of seven years has elapsed, whichever event may sooner occur; but if the mileage above-mentioned is run in under six years the locomotive is not to be withdrawn from service until a period of six years is completed.
- (b) The second examination of the boiler must be made when 130,000 locomotive miles have been run, or when a period of four years has elapsed, subject to the proviso contained in sub-clause (d).

- (c) After the above periods have been completed, the boiler must be examined when a further 100,000 locomotive miles have been run, or when a period of two and one-half years has elapsed, subject to provisos contained in sub-clauses (d) and (e).
- (d) If any boiler which becomes due for the second or any subsequent examination by effluxion of time is found to have run a low mileage, the Workshops Manager, Newport, may, if considered desirable, recommend for the approval of the Chief Mechanical Engineer that the boiler be kept in service for a further period. Should the low mileage run be due to the fact that the locomotive has been stored and out of running for some time, the Workshops Manager, Newport, shall, before making the recommendation hereinbefore mentioned, ascertain from the Superintendent of Loco. Running the actual time during which such locomotive was so stored and out of running.
- (e) Every locomotive boiler that has undergone repairs of such a nature as to make it fit for replacement purposes, should be examined by the Workshops Manager concerned and the Foreman Boilermaker, Newport, and its internal condition and the repairs executed specially reported to the Chief Mechanical Engineer, so that, should the circumstances warrant it, such boiler may be regarded as having had the tubes withdrawn for the first time, and consequently they should not be again withdrawn until 130,000 locomotive miles have been run, or a period of four years has elapsed.

- (f) A complete record of the life of every boiler is kept in the Chief Mechanical Engineer's Office, and also in the Office of the Workshop Manager, Newport.

99. (a) The boiler and firebox of every locomotive must be thoroughly examined inside and outside, as far as practicable, and afterwards tested with warm water, at intervals of not longer than 21 months for boilers up to seven years old, and eighteen months for boilers over seven years old.

(b) The examination and test must be made by the Boiler Inspector, in conjunction with the Depot Foreman or Fitter-in-Charge, and they must submit to the Chief Mechanical Engineer a joint certificate on "D" form (R.S. 249), showing the result of the examination and test, and that the repairs, if any, have been executed. A copy of the certificate must be made by the Officer-in-Charge and filed at the Depot.

(c) Any light repairs to the boiler or firebox which the examination shows to be necessary must be executed at the Depot but, if heavy repairs are required, a joint report from the Boiler Inspector and the Officer-in-Charge of the Depot concerned, giving full particulars of such repairs, must be forwarded to the Chief Mechanical Engineer, who will direct as to where the repairs are to be effected.

(d) When a boiler has been repaired, it must be tested with warm water by the testing officers at a pressure of 25 per cent. above the working pressure.

(e) Every boiler which has had extensive repairs to the barrel or firebox casing must, after being tested with warm water, be also tested by being kept under steam for at least three hours at the authorized working pressure, before being lagged.

100. Every locomotive boiler having steel flue and boiler tubes, steel firebox tubeplates and steel or copper firebox must be tested and examined as set out in the following instructions:—

(a) Every new boiler before being put into service must be thoroughly examined and tested, the tests to be carried out in the following order:—

- (i) Test boiler with hot water to 25 per cent. above working pressure.
- (ii) Steam test boiler at working pressure for at least three hours before arc welding tubes at firebox end.
- (iii) After arc welding tubes, steam test boiler at working pressure for at least three hours to prove welding.
- (iv) After the steam tests have been completed the boiler shall be painted with smudge over the exterior surfaces except the front of the smoke box.

A certificate stating that the above tests have been carried out, and that the boiler is satisfactory, is to be furnished as set out in Instruction 97.

(b) Every boiler must be examined at the end of twelve months and every subsequent twelve months dating from the time the boiler was tubed.

Each boiler and firebox must be examined inside and outside as far as practicable by taking off the dome cover, etc., and afterwards tested with warm water to a pressure 25 per cent. above the working pressure.

The flexible stays are to be hammer tested while the water in the boiler is maintained at the above pressure.

Six boiler tubes are also to be withdrawn for examination except at the first yearly examination, after new tubes only (not pieced up tubes) have been fitted. The exact tubes to be withdrawn to be pointed out by the Boiler Inspector.

(c) At the end of every two years in addition to the yearly examination, the flexible stays are to have the caps removed and the stay and sleeve examined except as stated hereafter. As this will necessitate the cleading being removed, the 2nd year examination should be made concurrent, as far as possible, with the shopping of the engine for tyres and general overhaul. The flexible stay caps are to be examined, as far as possible, without removing the cap. If the condition of the stays inspected is unsatisfactory, the cap is to be removed and all of them examined.

AMENDMENT TO INSTRUCTION 100—ROLLING STOCK BRANCH
BOOK OF INSTRUCTIONS

Instruction No. 100 relative to all steel boilers is to be amended as follows:—

- Page 44 Delete part (c) in its entirety
 Amend part (d) by substituting the letter (c) for (d) and deleting the words "and two yearly" in the first line
 Amend part (e) by substituting the letter (d) for (e)

Where the gaskets are damaged or require renewing, they are to be replaced by new ones. The new gaskets, which are furnished by Newport, are made in a conical form. These gaskets should be inserted with the small section outward; screwing the cap to its seat forces the gasket into place.

(C) In addition to the yearly and two-yearly examinations, the boiler must be examined as follows, at least every four years after new or pieced up tubes have been fitted. After a boiler is 12 years old, it is to be examined in the same manner every two years, unless, in the opinion of the Foreman Boilermaker, Newport, the repairs are such as to warrant the period of examination being extended from 2 to 4 years.

All tubes, except where otherwise provided, and lagging and cladding, shall be removed for the purpose of making a thorough internal and external examination of the boiler and its staying.

After the tubes and lagging have been removed, the boiler must be thoroughly scaled and cleaned inside and outside to enable the above examination to be properly carried out.

After repairs have been effected and tubes replaced, the boiler, before being placed in service, must be examined and tested in accordance with the procedure laid down for New Boilers. (See Instruction 100, clause (a).)

(d) The removal of boiler tubes will be due after 48 calendar months' service, provided such service is performed within five consecutive years. Portions of calendar months out of service will not be counted. If a boiler which has become due for the second or any subsequent examination by the effluxion of time is found to have run a low locomotive mileage, the Workshops Manager, may, if considered desirable, recommend for the approval of the Chief Mechanical Engineer that the engine be kept in service for a further period, should the low mileage run be due to the fact that the engine has been stored and out of running for some time. The Workshops Manager, before making the recommendation hereinbefore mentioned, to ascertain from the Superintendent of Loco. Running the actual time during which the engine was so stored and out of running.

101. Every locomotive boiler having either steel or brass tubes must be examined at every AE examination (see Instructions 131 to 133) by a competent boilermaker who must hammer test all stays in firebox and make a thorough examination for broken stays, bulged firebox plates, cracks, corrosion,

leaks, burnt tube ends and other defects. The superheater elements are to be cleaned and examined as far as possible and the smokebox examined for steam and air leaks, &c. In addition to the above, Instructions 118 and 133 (AB examination) are to be carefully carried out.

Flexible firebox stays must be hammer tested with a hydrostatic pressure in the boiler of not less than 50 pounds per square inch.

In addition, on S and X class locomotives with round top fireboxes the dome cover must be taken off and the flexible and crown stays examined from the inside. The result of such examination must be clearly shown on the chart.

102. The Workshop Managers at Newport, Ballarat, and Bendigo, in conjunction with the Foreman Boilermaker, Newport, will be held responsible for the inspection of the stationary boilers at their respective Workshops. The Boiler Inspector will be held responsible for the examination and testing of all stationary boilers elsewhere than at Workshops, and for seeing that the repairs he recommends are executed; the District Rolling Stock Superintendents and the Officers-in-Charge of Depots will be responsible for keeping such boilers in safe working order. The Chief Mechanical Engineer will supply the Workshops Manager at the commencement of each year with a list of all stationary boilers to be examined, or to be examined and tested during the year, and the Workshops Manager must see that such examinations are made in accordance with the following instructions:—

- (a) The boiler of every stationary, crane, pumping or other engine must be thoroughly examined inside and outside every year, and at the end of

every two years it must be tested with warm water at a pressure of 25 per cent. above the working pressure.

(b) The tubes of every stationary (locomotive type) boiler must be withdrawn, and the boiler and casing thoroughly examined internally by the Boiler Inspector at the intervals and under the conditions specified hereunder:—

- (i) The first examination of the boiler must be made when a period of seven years has elapsed.
- (ii) The second examination of the boiler must be made when a further period of four years has elapsed.
- (iii) After the above periods have expired, the Workshops Manager and the Foreman Boilermaker, Newport, will recommend within what period the next examination must be made, but the period must not exceed three and a half years. This joint recommendation regarding the period of examination must be forwarded to the Chief Mechanical Engineer after each subsequent internal examination.

Any portable or other boiler which cannot be internally examined as above must be reported to the Chief Mechanical Engineer with full particulars as to age, work done, and quality of water used.

103. A locomotive or stationary boiler must not be tested by the expansion of water, and if hot water is not available from other sources, the following method must be adopted:—The boiler must be filled with water, an opening being left in the top of it, such as the safety-valve or the plug in the dome. The water must then be brought nearly to boiling point, and at this stage the fire must be drawn and the test pump applied.

104. Every boiler must have a number, and the number of any boiler must not be changed except with the authority of the Chief Mechanical Engineer.

105. Every boiler must be fitted with a plate showing the working pressure authorized by the Chief Mechanical Engineer. Any employe tampering in any manner whatever with the safety valves, or doing anything which would increase or tend to increase the working pressure, will be liable to instant dismissal.

106. A complete report in detail on "A" form (R.S. 243), showing the state of the boiler, firebox, &c. of any locomotive under boiler or firebox repairs at any Workshop must be forwarded by the Workshop Manager with his recommendation to the Chief Mechanical Engineer, who shall decide what repairs, &c., are to be executed.

107. When extensive repairs to a boiler are required, the Officer-in-Charge of the Depot must notify the Chief Mechanical Engineer, who will instruct either the Foreman Boilermaker, Newport, or the Boiler Inspector to examine the boiler, decide what work is to be done, and when the repairs have been completed, examine and test the boiler.

108. When renewing any portion of an old boiler, the material used, makers' name and brand must be stated on the boiler report.

109. Every boiler that comes into a Workshop for repairs must have the steam gauge, safety valves, and safety valve springs tested and adjusted. Stationary boilers and boilers of steam cranes and shovels shall have the safety valves adjusted to the authorized boiler working pressures. Locomotive boilers shall have the safety valves adjusted as laid down in Practice Cards L32-1 and L32-2.

110. The safety valves of every stationary boiler must be tested each day to see that the valves do not stick.

111. When renewing a gauge glass, care must be exercised to see that the water and steam ways are not blocked up by the packing.

112. When brass tubes are withdrawn, they must be thoroughly cleaned, examined, and checked for the correct weight in accordance with the schedule hereunder. Any tube below the minimum weight specified in the schedule, or which is less than No. 11 B.W.G. thick at the firebox end, or No. 13 B.W.G. at the smokebox end must not be used in any boiler.

SCHEDULE OF NEW AND MINIMUM WEIGHTS OF
BOILER TUBES (BRASS).

Class of Engine.	Diameter of Tube In Inches.	Approximate Weight New.	Lowest Weight.	
			First Examination.	Second Examination.
		lbs.	lbs.	lbs.
A1 and 2	2	42	36	32
C	2	43	37	33
D1, 2, 3, and 4 ..	2	37	32	28
E	2	31	26	23
G	1 $\frac{3}{4}$	23	19	17
K	2	40	34	30
N	2 $\frac{1}{4}$	59	49	44
NA	2	34	29	25
R	2	31	26	23
T	1 $\frac{7}{8}$	25	21	19
Y	1 $\frac{3}{4}$	26	22	20

113. When knocking up a brass tube care must be taken to see that there is sufficient projection at both ends of the tube to ensure good service. If the end of a tube is within the face of the smokebox tubeplate it must be renewed.

114. When brass boiler tubes project less than 1/16th inch at the smokebox tubeplate, the Boiler Inspector must be notified and he shall decide whether the tubes are to be renewed.

115. If a number of tubes are found to have the projecting ends burnt off at the firebox and appear to be within the face of the tubeplate, and are not leaking, the Officer-in-Charge of the Depot must notify the Workshops Manager, Newport, who will advise what action is to be taken.

116. When a brass tube is found leaking at the firebox tubeplate and the end of the tube is level or within the face of the tubeplate, it must be knocked up or renewed as may be found necessary.

117. Tube drifts must not be used under any circumstances for expanding locomotive boiler tubes. Great care must be exercised when expanding them in order not to enlarge or elongate the tube holes in the tubeplate. Only qualified employes must be permitted to expand, bead or weld boiler tubes in position.

118. When a broken stay is detected in a firebox, the stay must be renewed within six days. No boiler shall be allowed to remain in service when two adjacent stays are broken in the firebox or combustion chamber, nor when three or more are broken in an area of four feet diameter, nor when five or more are broken in the whole firebox, including the combustion chamber.

119. Copper stays must be riveted cold, and when any stay is found broken, or with the head too thin, it must be replaced. The chipping of any copper stay which projects too much is not permitted.

120. Any employe before being placed in charge of a stationary boiler under steam, must be certified as competent by a Workshop Manager, the Superintendent of Locomotive Running, a District Rolling

Stock Superintendent, or in case of emergency, by a Depot Foreman. These officers must certify to the competency of the employe concerned, in writing, to the Chief Mechanical Engineer.

121. Before a fire is lit in a stationary boiler, the water gauge glass and water level must be tested and checked by the test cocks. Testing must be repeated

ROLLING STOCK BRANCH.

BOOK OF INSTRUCTIONS.

Instruction 122 is to be deleted and the following amended instruction inserted in its stead (page 51).

122. Every stationary locomotive type steam boiler in regular work must be washed out at least once each 8 weeks or more often if necessary. Any such boiler not in regular work must be washed out as circumstances require.

Stationary steam boilers, of other than the locomotive type, must be thoroughly washed out at least once per six months.

Babcock & Wilcox type boilers must have the manhole covers and mud-gates removed, and the steam drums cleaned before washing out.

Hot water boilers must be washed out at least once per year, prior to the annual inspection.

A boiler must not have its water level reduced below the bottom of the water gauge until its temperature has been allowed to fall unaided to below 90°F. Only in the case of an emergency should cold water be introduced into the boiler to cool it down.

The closest supervision must be exercised over the washing out operations to see that the work is thoroughly done.

126. (a) A boiler must not be left empty even for a short period unless a plate bearing the words "Boiler Empty" is hung on the front of the firebox. The employe who leaves the boiler empty must place this plate in position immediately the boiler is left empty and also inform his supervisor who must ensure that the engine is not lit up until the boiler has been filled.

(b) The water in every boiler when not in regular work, must be run off, and sufficient plugs drawn at the bottom and the top to create a current of air through the boiler.

127. The Boiler Inspector must report to the Chief Mechanical Engineer any case of neglect which comes under his notice.

128. (a) In every case of the fusing of a lead plug in a locomotive or other boiler the Driver or other Employe in charge of the locomotive or boiler must immediately draw the fire.

(b) The employe in charge of the boiler must immediately notify his Superior Officer and, if at a Workshop, the Chief Mechanical Engineer and the Workshops Manager must be promptly advised. If at a Depot or on a locomotive in service the Chief Mechanical Engineer, the Superintendent of Locomotive Running and the District Rolling Stock Superintendent must be notified at once by telephone or telegraph.

129. In every case a special investigation is to be made immediately into all the circumstances of the case by—

(a) The Workshops Manager concerned and the Foreman Boilermaker, Newport, in all cases at Workshops.

(b) The District Rolling Stock Superintendent and the Boiler Inspector in every case at a Depot or on a locomotive in service.

130. In every case other than at a Workshop the following procedure must be carried out:—

(a) The locomotive concerned is to be impounded and nothing must be done to the engine, or any of the Boiler Mountings, until the Boiler Inspector has made an examination and given permission for the engine to be lit up.

(b) After the Boiler Inspector has given this permission, the boiler must be filled to half a glass and a fire placed in the firebox. When steam has been raised the gauge glasses and boiler mountings must be thoroughly tested and examined by the District Rolling Stock Superintendent or Depot Foreman in the manner set out hereunder:—

The gauge glass steam cocks on top of the boiler must be tested to see that each one is fully open and each gauge glass, mounting, and union nut must be thoroughly examined for signs of leakage of steam or water.

Each gauge glass must be tested as set out below:—

- (i) The straight handle of the bottom mounting must be turned fully to the right to give the steam passage a blow through to the drain pipe.
- (ii) The straight handle must then be turned fully to the left; the water should rise smartly into the glass. If the water rises slowly it indicates that the water passage is partially blocked.
- (iii) The steam cock on the top of the boiler must then be closed; the water should rise in the glass until the top of the water is out of sight.
- (iv) The straight handle must then be turned slightly to the right to give the water passage a blow through to the drain pipe.

- (v) The straight handle must then be turned to the left and the water should again rise until the top of the water is out of sight.
- (vi) The steam cock on top of the boiler must then be opened to its fullest extent; the water should return quickly to its former level in the glass. If the water settles back slowly, the steam passage is partially choked.
- (c) Each gauge glass on the locomotive concerned is to be tested separately as set out above. This test is to be made with the gauge glasses, cocks and mountings in the same condition as when the fusing of the lead plug occurred. The height of the water in each glass is to be measured before the test is commenced and after it is completed and the measurements recorded.
- (d) The gauge glasses are then to be removed, but no attention is to be given to the mountings, and new or reconditioned glasses placed in the mountings and the tests as set out above repeated, the height of the water in each glass to be again measured and recorded before and after the test.
- (e) An engine of the same class and type as the one on which the fusing of the lead plugs occurred is then to be selected and the gauge glasses of this engine tested, and the height of the water in in each glass measured and recorded.
- (f) The gauge glasses which were in use on the engine on which the fusing of the lead plug or lead plugs occurred are then to be fitted to the selected engine and tested. The height of the water in each glass is to be measured and recorded.
- (g) It is to be clearly understood that whilst No. 1 or No. 2 series of tests are being made on the respective engines water must not be fed into the boiler of either engine.

(h) The gauge glass mountings of the engine concerned in the fusing of the lead plugs are then to be removed and thoroughly examined, and their condition recorded. Should the tests indicate any defect such as steam or water passages partially choked or irregular water levels, then a special examination is to be made to locate the cause of the defect.

(i) Full reports of the circumstances in regard to the fusing of the plugs, together with the result of the examination of the boiler and firebox and the results of the tests, are to be forwarded to the Chief Mechanical Engineer.

EXAMINATION OF LOCOMOTIVE PARTS ON A MILEAGE BASIS.

131. Locomotive parts are to be examined on a progressive mileage basis as shown in the following instructions:—

(a) At each Depot the daily trips and mileages run by all locomotives under the control of the Depot are to be recorded on Form D. 305, or in a book specially adapted for this purpose. The necessary information for Depot locomotives is to be collated from the T.R. forms, and that for locomotives at Outstations must be wired by the Fitter or Driver-in-Charge each day. Any running done by a locomotive at a Depot other than that at which it is stationed must be wired to the Home Depot on the morning of the day following that on which the mileage was incurred.

Where shunting is performed the mileage is to be calculated on the basis of five miles per hour of shunting.

The daily progressive mileage of each locomotive is to be recorded each morning on Form R.S. 234A for the information of the Sub-Foreman or Leading Hand Fitter.

When a locomotive is approaching a mileage at which an examination is due the Clerk recording the mileage must notify the Depot Foreman of the mileage run and which examination is coming due in ample time to permit of the locomotive being available for the required examination.

(b) When a locomotive is about to be held for any A.B. examination the Sub-Foreman or Leading Hand Fitter must make a thorough inspection of the locomotive while it is under steam, note all steam, water, and air leaks and any other part which requires attention. Any defects must be entered on a Repair Card and remedied while the locomotive is undergoing the AB examination.

(c) It must be clearly understood that the object of these examinations is not only to locate defects, but also to remedy them. At each examination the parts concerned are to be properly inspected for defects and undue wear. Defective or unduly worn parts are to be repaired or renewed in accordance with the appropriate Practice Cards, or, in the absence thereof, with established good engineering practices. In addition, a general inspection must be made as far as is possible of all other parts and any defective part attended to in the same manner. The objective is to so recondition the locomotive that no mechanical attention will be necessary between AB examinations.

(d) All flaws which are not sufficiently bad to necessitate the locomotive being taken out of service must be carefully marked with a fine centre punch and kept under observation. A record of each flaw must be made on the examination sheet, and full details of the location and nature of the flaw must be reported to the Chief Mechanical Engineer.

(e) The mileage at which each part is examined, the date of completion of such examination, and the name of the employe who performs the examination must be recorded for each part of the locomotive on Forms R.S. 235 or 235b.

132. (a) The various parts of locomotives to be examined have been divided into five examination groups designated by the key letters A, B, C, D, and E. The mileage basis and the key letter for each examination is shown hereunder:—

Mileages.	All Locos., Except Pilots, Garratt, and S. Class.	Pilots Garratt S.
1,500- 1,650	A	A
3,000- 3,300	AB	AB
4,500- 4,650	A	A
6,000- 6,300	AB	AB
7,500- 7,650	A	A
9,000- 9,300	AB	ABC
10,500-10,650	A	A
12,000-12,300	ABC	AB
13,500-13,650	A	A
15,000-15,300	AB	AB
16,500-16,650	A	A
18,000-18,300	AB	ABCD
19,500-19,650	A	A
21,000-21,300	AB	AB
22,500-22,650	A	A
24,000-24,300	ABCD	AB
25,500-25,650	A	A
27,000-27,300	AB	ABCE
28,500-28,650	A	A
30,000-30,300	AB	AB
31,500-31,650	A	A
33,000-33,300	AB	AB
34,500-34,650	A	A
36,000-36,300	ABCE	ABCD
37,500-37,650	A	A
39,000-39,300	AB	AB
40,500-40,650	A	A
42,000-42,300	AB	AB
43,500-43,650	A	A
45,000-45,300	AB	ABC
46,500-46,650	A	A
48,000-48,300	ABCD	AB
49,500-49,650	A	A
51,000-51,300	AB	AB
52,500-52,650	A	A
54,000-54,300	AB	ABCDE
55,500-55,650	A	

132. (a) The various parts of locomotives to be examined, &c.—*continued.*

Mileages.	All Locos., Except Pilots, Garratt, and S. Class.	Pilots Garratt S.
57,000-57,300	AB	
58,500-58,650	A	
60,000-60,300	ABC	
61,500-61,650	A	
63,000-63,300	AB	
64,500-64,650	A	
66,000-66,300	AB	
67,500-67,650	A	
69,000-69,300	AB	
71,500-71,650	A	
72,000-72,300	ABCDE	

(b) When an examination has been completed the key letter for the appropriate examination must be recorded in red ink on the progressive mileage form above the mileage run at the date of the examination.

133. The mileages at which each A, B, C, D, and E examination must be carried out, and in the case of locomotives running a low mileage, the intervals between examinations and the parts which must be examined at each examination are shown in Sections 1 and 2 of the Schedule for Examination of Locomotive Parts as set out hereunder.

Section 1 applies to all locomotives except Pilots, while Section 2 applies to Pilot locomotives only.

In Sections 1 and 2 the "A" examination basis is 1,500 miles and the "AB" 3,000 miles. These mileages may be exceeded by 150 and 300 miles respectively, at the discretion of the Depot Foreman, after giving due consideration to shed activities and traffic demands.

SCHEDULE FOR EXAMINATION OF LOCOMOTIVE PARTS.

Section 1.—All A1, A2, C, D1, D2, D3, H, K, N, S, X, Garratt, and NA Class Locomotives.

“A” Examination—Basis every 1,500 miles.

Narrow Gauge Locomotives (“NA” Class only) not running 1,500 miles within a month are to have the “A” examination carried out every month.

Wheels, tyres, axles, frames.

Special examination of coupled wheel tyres for flaws on “A1,” “A2,” “C,” “D1,” “D2,” “D3,” “K,” “N,” “S,” and “X” classes.

Intermediate buffers (radial type) lubricated. Flange lubricators.

Turbo Generator.—Run turbo generator, check voltage and lamps.

“AB” Examination—Basis every 3,000 miles.

Low Mileage.—Locomotives which do not run 3,000 miles within six weeks are to have the “AB” examination carried out every six weeks. (Permissible to extend by four days, the maximum time period not to exceed 46 days.)

Narrow Gauge Locomotives (“NA” Class only) not running 3,000 miles within two months are to have the “AB” examination carried out every two months.

Axles.—Built up crank axles, axles with flaws over 1 inch long.

Brake Equipment.—Brake blocks, hangers, hanger brackets, brak shaft brackets and studs, and all brake rigging to be examined in position. Main, auxiliary, and equalizing reservoirs. All brackets, clips, air piping and connections to be examined for security. Governor vent nipple cleaned. C.6 feed valve to be dismantled and cleaned.

Brake valve, rotary valves and spindle washer examined, cleaned and lubricated. Brak shaft bracket oil cavity to be cleaned, repacked and oiled. Test air brake equipment.

Section 1—continued.

Framing.—Main frames, pony, bogie, trailing truck, tender and tender bogie frames. Pony, bogie and tender bogie centres, pony and bogie swing links, trailing and pony truck centring devices.

Cylinder frame stay castings, frame stays, horn castings, cheeks and stays. Coupled axlebox clearances in horns tested with feelers and wedges adjusted. Slide bar crosshead clearances checked and adjusted.

Boiler.—Boiler, flue and arch tubes, syphons (internal examination with arch and syphon caps removed). Barrel and water spaces, stays, firebox, firebox crown, flexible stays. Wash-out plugs. Firebox fusible plugs examined and refilled with new lead. Brick arch. Firehole door, ring, and protection plate. Baffle plate. Grates and grate operating gear. On every occasion a brick arch is removed, the stays uncovered are to be examined and hammer tested.

Ashpan.—Ashpan, ashpan studs, set screws, bolts, ashpan slides, air and manually operated doors, ashpan door operating gear and locking devices. Ashpan flushing piping. Damper and operating gear, ash arrester and operating gear.

Smokebox.—Smokebox door, floor, examine and test for steam and air leaks. Chimney and joints, blast pipe, blast pipe cap cleaned. Spark arresters, woven-wire screens, grids, cages, cones, deflector plates, table plates, back and header plates, elements, blower ring, pipes and connections.

Main steam pipes, air compressor steam and exhaust pipes and connections.

Boiler Mountings.—Inspect for steam leaks. Blow-off cock, pipes and clips. Steam pressure gauge stop cock eased and greased. Water gauge glasses tested.

Section 1—*continued.**Injectors.*—

Gresham.—Clack and steam valves.

Nathan.—Starting, delivery check and boiler check valves.

Exhaust Injector.—Top check valve of combined steam and delivery valve.

All Injectors.—Water hoses, piping, strainers and baffles.

Ashpan flushing cock greased.

Lubrication.—All lubricator piping and connections. Mechanical lubricator strainer cleaned and drain plugs tested for water in lubricator. Auxiliary oil boxes, cups, piping and connections. Renew trimmings and cane plugs as required. Trailing truck pivot replenish grease or oil.

Sand Gear.—Test hand and air operation. Sand boxes, sand pipes and brackets for security. Sand pipes for alignment.

Big Ends.—Big end brasses must be properly butted and securely wedged.

Stoker.—Stoker engine and conveyor. (See special instruction.)

Coal Sprinkler.—Drain plugs and nozzles.

Turbo Generator.—Check voltage, lamp fittings, &c. Replenish oil in sumps.

General.—Gangway chains, engine tool equipment, enginemen's kits, air raid precaution fittings, cleading, handrails, lamp brackets.

"ABC" Examination—Basis every 12,000 miles.

NOTE.—"S" and Garratt classes shall be examined on 9,000 miles basis.

Narrow Gauge Engines ("NA" Class only) which do not run 12,000 miles within a year are to have the "ABC" examinations carried out yearly.

Section 1—*continued.*

Wheels.—Crank pins, crank axles examined with connecting rods removed. Axlebox covers cleaned and checked for security. Axles for flaws up to 1 inch.

Special examination of "H" class coupled wheel tyres for flaws.

Brake Equipment.—Air compressor. Single stage compressors, main valve and reversing valve and rod examined. Cross compound compressors, reversing valve and rod examined. Air cylinder lubricators, ball lubricator, horse-hair strainer, exhaust silencer. Bottom cover removed. Air valves and seats. Air compressor governors. Retention valves, release valves. Triple valves. Distributing valves and attachments. Double check valves. Driver's automatic, independent and straight air-brake valves. Simple feed valves, M.3 feed valves, Consolidated Brake Company's feed valves. Equalizing reservoir control valve, train pipe cocks, hoses and air piping. Engine brake cylinder red oiled through oil plug holes. Brake cylinder safety valves. Hand brakes. Copper pipe to M.3 feed valve annealed. Test air brake equipment.

Cylinders.—Cylinders, cylinder covers, studs. Piston head and rings. Piston rods, nuts and cotters. Tail rod bushes. Relief valves. Vacuum valves. By-pass valves, pipes, nipples and connections. Piston rod packing. Release cocks and operating gear. By-pass valve branch pipes annealed.

Motion.—Slide bars, slide bar bolts and studs, slide bar brackets, spectacle plate, crossheads, arms, oil cups, cotters (removed). Gudgeon pins, connecting rods, big and little ends, big end bolts and straps. (Big end straps removed and crank axles examined.) Revolving bushes. Side rods (removed). Side rod bushes, knuckle pins and bushes. Check piston clearances.

Valves and Valve Gear.—Piston and slide valves, spindles, nuts and cotters. Rings, junk heads. Bushes and distance pieces. Valve buckles. Steam chest covers, dummy glands, intermediate valve spindles, and

Section 1—*continued.*

guides (in position). Pipes and nipples. Packing. Eccentric rods and eccentric arms removed and examined for flaws.

Examine in Position.—Eccentric sheaves, straps, quadrants and blocks. Valve and reverse gear pins. Reversing shaft and arms, reversing shaft brackets and studs, reversing screws, reversing rod, combination lever, combination links, radius rods, radius rod blocks, radius rod hangers, stretcher bars.

Boiler.—Arch tubes and syphons, "H," "S" and "X" class, external examination (two front rows of bricks, combustion chamber end removed). Arch tubes, "H," "S" and "X" classes, rotary cleaner used. Boiler steadying and expansion brackets, plates and studs or bolts.

Safety Valves (other than Coale and Ross), stripped, examined and checked with standard pressure gauge. Ross safety valves on Garratt tested for accuracy.

Gauges, Brackets.—Water gauges, valves faced up. Water column and nipple. Steam pressure gauges checked with standard gauge. All piping and connections. All steam valves examined. All Westinghouse brake gauges.

Steam valves of boiler mountings (not already specified) and turbo and steam valves examined and refaced or ground.

Coal Sprinkler.—Pipes and unions, steam and delivery nozzles, remove and examine.

All boiler mountings.—Examine for repacking. Whistle and whistle operating gear.

Lubricators.—All sight feed lubricators, examine and cleaned out. Choke valves. Atomizer. Mechanical lubricator cleaned, ratchet cover removed, driving gear examined, check valves cleaned, anti-carbonizer. Lubricator steam valves.

Section 1—continued.

Injectors.—

Gresham Injectors.—Completely dismantle.

Exhaust Steam Injectors.—Examine interior and clean, remove cones, clean and examine, examine all joints.

Nathan Injectors.—Cones removed. All tender feed pipes and cocks.

Sand Gear.—Sand boxes emptied, valves, pipes, brackets and operating gear.

Booster.—All steam and air valves. Release cocks and operating devices. Drip valves on ball joint elbows. Flexible air pipes and piping connections. All steam pipes. Reverse lever pilot valve and latch. Preliminary throttle valve. Dome pilot valve. Booster turret valve. Booster throttle valve. Throttle valve operating cylinder. Heater valve. Booster clutch cylinder. Choke valve. Booster bearings, wool rolls in position.

Air-operated Devices.—Ashpan door, air cylinder piston oiled and tested. Franklin fire door and operating valve dismantled. Air sander valves. "H" class reversing gear air cylinder. Air cylinder for release cocks.

Smokebox.—Blast pipe examined and excessive carbon burnt out.

Springs.—Springs, spring beams and spring hangers in position.

Turbo Generator.—Generators examined. Electrical fittings and conduit. Lamps and reflectors cleaned. (See special instructions.)

General.—Footplate, cab and fittings, staff exchanger and gear. Speed recorder and gear in position. Automatic coupler knuckles checked with limit gauge. Pony truck radius bar.

Section 1—continued.

“ ABCD ” Examination—Basis every 24,000 miles

NOTE.—“ S ” and Garratt classes on 18,000 miles basis.

Narrow Gauge Engines (“ NA ” class only) which do not run 24,000 miles in two years are to have the “ ABCD ” examination carried out every two years.

Brake Equipment.—Brake cylinders, pistons removed, cleaned, lubricated and tested for leakage.

Draw Gear.—Buffer beams, buffers, king pins, intermediate draw gear, draw gear, draw hooks, automatic coupler, screw coupling, link pin and coupler head attachment. Intermediate drag boxes and bushes.

Safety Valves.—Coale safety valves (“ S ” class only) tested for accuracy.

Coale safety valves, “ H ” and “ X ” classes, Ross safety valve (Garratt) stripped, cleaned, ground in and tested.

Stoker.—Check valve setting. Examine for knocks, &c. (See special instruction.)

Tender.—Lift and oil bogie centres.

General.—Speed recorded gear boxes dismantled. Screw jacks, ashpan door air cylinder piston removed.

“ ABCE ” Examination—Basis every 36,000 miles.

NOTE.—“ S ” and Garratt classes on 27,000 miles basis.

Narrow Gauge Engines (“ NA ” class only) which do not run 36,000 miles in four years to have the “ ABCE ” examination carried out every four years.

Wheels and Axles.—Engine bogie or pony boxes with drop pans; remove pan and renew wool rolls. Trailing truck axleboxes; renew wool rolls.

Brake Equipment.—Renew all brake hose pipes.

Section 1—continued.

Valve Gear.—Eccentric sheaves removed and axles examined. All valve gear stripped, including quadrants and quadrant hangers. Stretcher bars examined in position after removal of quadrants. All valve gear pins removed, and examined. Intermediate valve spindles removed and cotter holes examined.

Mechanical Lubricators.—Lubricator dismantled and cleaned, pipes annealed.

Tender.—Tank emptied and cleaned.

“ABCDE” Examination—Basis every 72,000 miles.

NOTE.—“S” and Garratt classes on 54,000 miles basis.

Wheels.—Dropped or engine lifted. Axle boxes, springs, spring hangers, spring pins, all spring beams and bushes, compensating beams and pins examined. Engine height and weight distribution adjusted. Engine bogie and pony boxes (other than drop pans), main engine boxes. Remove pans and renew wool rolls.

Safety Valves. *Coale Safety Valves* (“S” class) stripped, cleaned, ground in and tested.

Tender.—Dismantle bogies and examine spring beams and spring pins. Dismantle axle boxes, examine brasses and renew wool rolls.

Booster.—Air line hoses renewed.

Stoker.—See special instructions.

Section 2.—Pilot Locomotives, “D4”, “E”, “Y” and “T” Classes.

“A” Examination—Basis every 1,500 miles.

Locomotives which do not run 1,500 miles within three weeks are to have the “A” Examination carried out every three weeks.

Wheels, tyres, axles, frames, flange lubricators.

Section 2—*continued.*

"AB" Examination—Basis every 3,000 miles.

Low Mileage.—Locomotives which do not run 3,000 miles within six weeks are to have the "AB" examination carried out every six weeks. (Permissible to extend by four days; the maximum time period not to exceed forty-six days.)

Brake Equipment.—Brake blocks, hangers, hanger brackets, brake-shaft brackets and studs, and all brake rigging to be examined in position.

Main, auxiliary and equalizing reservoirs and all bracket clips, all air piping and connections to be examined for security. Governor vent nipple cleaned. C.6 feed valves to be dismantled and cleaned. Brake valve rotary valves and spindle washer examined, cleaned and lubricated. Brakeshaft bracket oil cavities to be cleaned, repacked and oiled. Test air brake equipment.

Framing.—Main frames, bogie, tender and tender bogie frames, bogie and tender bogie centres, bogie swing links, cylinder frame stay castings, frame stays, horn castings, cheeks and stays. Coupled axle box clearances in horns, tested for clearance with feelers and adjusted. Slide bar crosshead clearances checked and adjusted.

Boiler.—Boiler tubes. Barrel and water spaces, stays, firebox, firebox crown, crown stays. Washout plugs. Firebox fusible plugs examined and refilled with new lead. Brick arch. Firehole door. Baffle plate. Firehole protection plate. Grates and grate operating gear.

Ashpan.—Ashpan, ashpan studs, set screws, bolts, ashpan slides and doors, ashpan door operating gear and locking devices. Damper and operating gear. Ash arrester and operating gear.

Smokebox.—Smokebox door, floor, examine and test for steam and air leaks. Chimney and joints. Blast pipe, blast pipe cap cleaned. Spark arresters, cones

Section 2—*continued.*

and plates, blower ring, pipes and connections. Main steam pipes, air compressor steam and exhaust pipes and connections.

Boiler Mountings.—Blow-off cock, pipes and clips. Steam pressure gauge stop cock eased and greased. Water gauge glasses tested.

Injectors.—Gresham: Clack and steam valves. Water hoses, piping and strainers.

Lubrication.—All lubricator piping and connections or auxiliary oil boxes, cups, piping and connections. Renew trimmings and cane plugs as required.

Big Ends.—Big end brasses must be properly butted and securely wedged.

General.—Gangway chains, engine tool equipment, enginemens' kits. Air raid precaution fittings, cleading, handrails, lamp brackets. Sand pipes for security and alignment.

“**ABC**” Examination—Basis every 9,000 miles.

Wheels.—Built up crank axles. Axles for flaws over 1 inch long.

Brake Equipment.—Air compressor; bottom cover removed. Air valves and seats. Main valve and reversing valve and rod. Exhaust silencer. Horse-hair strainer. Compressor governor, air cylinder lubricator, ball lubricator. Retention valves, release valves, triple valves, drivers' brake valves, double check valve, feed valves. Train pipe cocks and hoses. Air pipes. Engine brake cylinders red oiled through plug hole. Brake cylinder safety valves. Hand brakes. Test air brake equipment.

Boiler Mountings.—All boiler mountings examined for steam leaks. Steam valves of boiler mountings (not already specified) examined and ground in. All mountings examined for re-packing. Whistle and operating gear. All pipes and connections.

Section 2—continued.

Safety Valves.—Safety valves examined and checked with standard pressure gauge.

Gauges.—Brackets. Steam pressure gauge checked with standard pressure gauge. All air pressure gauges. Water gauges, valves faced and water-ways proved clear.

Injectors.—Completely dismantled. All water hoses disconnected and piping examined. All water cocks.

Springs.—Springs and spring gear in position.

Sand Gear.—Sand boxes, pipes and operating gear.

General.—Enginemens' seats.

Lubricators.—Sight feed lubricator examined and cleaned out. Lubricator steam valve, choke valve.

" ABCD " Examination—Basis every 18,000 miles.

Axles.—Axles for flaws up to 1 inch long. Crank pins.

Brake Equipment.—Brake cylinders. Pistons removed, cleaned, lubricated and tested for leakage.

Boiler.—Boiler expansion brackets and studs.

Valves.—Pistons and slide valves. Spindles, nuts and cotters. Rings, junkheads, bushes and distance pieces. Valve buckles, steam chest covers, dummy glands, intermediate valve spindles and guides (in position), pipes and connections, packing.

Examine in Position.—Eccentric sheaves, straps, rods, quadrants and blocks, motion pins, reversing arms, reversing gear, reversing rod and reversing shaft, bracket and studs.

Motion.—Slide bars and bolts, studs, and brackets. Spectacle plate. Connecting rods removed. Big and little ends, gudgeon pins, big end bolts and straps. Side rods removed. Knuckle pins, and bushes, side rod bushes. Check piston clearances.

Section 2—continued.

Draw Gear.—Buffer beams, buffers, king pins, intermediate draw gear, draw gear, draw hooks, automatic coupler, link pin, and coupler head attachment. Screw and link couplings.

Release Cocks.—Cylinder and steam chest release cocks and operating gear.

Smoke Box.—Blast pipe examined and excessive carbon burnt out.

General.—Footplate, footboards, cab and fittings.

"ABCE" Examination—Basis every 27,000 miles.

Brake Equipment.—Renew all brake hose pipes.

Cylinders.—Cylinder, cylinder covers, studs, piston rods, nuts and cotters, piston heads and rings. Relief valves, vacuum valves, piston packing. Crossheads removed from piston rods. Check piston clearances.

Valve Gear.—All valve gear stripped, including quadrants and quadrant hangers, quadrant blocks. Eccentric sheaves removed and axles examined. All pins removed and examined. Intermediate valve spindles removed and cotter holes examined.

Tank.—Tank cleaned.

"ABCDE" Examination—Basis every 54,000 miles.

Wheels dropped or engine lifted, and springs, spring hangers, spring pins, all spring beams and bushes, compensating beams and pins examined. Engine height examined and adjusted. Engine bogie boxes, main engine boxes. Examine brasses; remove pans and renew wool rolls.

Tender.—Dismantle and examine all springs, beams and bushes, and spring pins. Dismantle axle boxes, examine brasses and renew wool rolls.

LIGHTING UP.

134. To prevent damage to locomotive boilers and cabs during lighting up and raising steam the instructions set out below must be strictly observed:—

(a) Before an employe commences to light up a locomotive, either cold or under steam, he must inspect the gauge glasses, pipes and connections, and see that they are in good order; must see that about half a glass of water is showing in both gauge glasses and then test the water level in each gauge glass as shown in clauses (b) or (c) hereunder:—

(b) *Boilers not under Steam.*

(i) Must see that the steam valve on top of the boiler is fully opened.

(ii) Must turn the water valve handle clockwise as far as possible, and as the water in the boiler is then shut off, the water in the glass should disappear and escape through the drain pipes.

(iii) Must turn the water valve handle counter clockwise as far as possible and the water should again rise smartly in the glass. If it rises slowly the water passage is partially blocked.

(iv) Must see that the water level in each glass is the same.

(v) When steam has been raised the test as shown for "Boilers under Steam" (sub-clause "C") must be carried out.

(c) *Boilers under Steam.*

(i) Must close the steam valve on top of the boiler.

- (ii) Must turn the water valve handle clockwise about half a turn. This permits water to flow from the boiler direct to the drain pipe and assists in keeping the water passage clear.
 - (iii) Must turn the water valve handle clockwise as far as possible.
 - (iv) Must open the steam valve on top of the boiler and allow steam to blow through the glass to the drain pipe and so assist in keeping the glass clean.
 - (v) Must turn the water valve handle counter clockwise as far as possible when the water should rise smartly in the glass. If it rises slowly this indicates a partial blockage of the water passage; if it rises high in the glass and then settles back slowly the steam passage is partially choked.
 - (vi) Must see that the water level in each glass is the same.
 - (vii) On "H," "S" and "X" class boilers the drain valve of the water column must also be opened for about five seconds in order to prevent any accumulation of sediment.
- (d) He must see that the regulator is closed, the reversing gear is in mid gear, the hand brakes are screwed on and the release cocks are open; see that the Injector Steam Valves, Blower Valve, Turbo Steam Valve, Lubricator Steam Valve and Air Compressor Steam Valve are closed; examine the firebox, brick arch, baffle plate, firebars and

grate, and see that they are in good condition; try over the damper to see that it works freely, but leave it in the closed position.

He must then proceed to the smokebox along the left-hand side of the engine, but on the way must see that the Damper is closed, and that the ashpan slides are closed and properly secured either by the pawl or locking device.

He must thoroughly clean all spark arresting appliances in the smokebox with the wire brush or grid tool, and closely examine them for defects; remove any ashes from behind the door plate; clean the smokebox ring against which the door closes and screw the door up as tightly as possible by hand.

He must then return towards the cab along the right-hand side of the engine and see that the ashpan slides on that side are properly closed and secured. If the engine is standing over a pit the examination of slides must also be made from the pit.

(e) Any defects which have been observed, particularly in regard to the water gauge glasses and the spark and ash arresting appliances, must be reported immediately to the Officer-in-Charge, and he must take any action necessary to ensure that the locomotive is in a safe and proper condition before lighting up is commenced.

(f) The Lighter Up must then proceed to light up the boiler in the following manner:—

(i) A layer of selected lumpy coal must be placed around the four sides of the grate leaving the centre portion uncovered.

- (ii) A few pieces of lighting-up wood are then to be placed in the centre portion of the grate, the kindling material ignited and placed on the wood, the remainder of the wood placed in position over the ignited kindling material and the fire allowed to burn in that condition *with the damper closed and the firedoor open.*
- (iii) If necessary additional wood may be used to raise sufficient steam pressure to enable the blower to be used.
- (iv) The blower valve may then be opened slightly and coal put on in small quantities and at such intervals as to maintain a bright fire and to ensure that the boiler will have approx. 100 lb. of steam when the crew is due to sign on. *When the blower is being used the firedoor must be closed and the damper opened slightly.*
- (v) In emergency cases coal may be added to the fire before the boiler has generated sufficient steam to work the blower of the locomotive provided the air blower is used. While the air blower is being used *the firedoor must be closed and the damper opened slightly.*
- (vi) Particular care must be taken to see that all lighting-up wood is completely consumed before the locomotive leaves the Shed.

- (g) In order to prevent wastage of fuel, boilers must not be lit up earlier than is necessary, and the practice of lighting up in anticipation of the locomotive being ordered should not be carried out.
- (h) During the whole of the time the Lighter Up is maintaining the fire, he will be responsible for keeping the spark arresters clear, and the footplate swept clean and for seeing that smoke and flame do not enter the cab. The presence of flame or smoke in the cab indicates that either the draught through the ashpan is excessive or the spark arresters require cleaning.

WASHING OUT.

135. (a) The boiler of every locomotive at a Depot or Outstation must be washed out as often as is directed by the Officer-in-Charge.

(b) The Officer-in-Charge at a Depot or Sub-Depot or the Driver-in-Charge at an Outstation must exercise close supervision in order to see that the work of washing out is thoroughly and carefully carried out.

(c) An employe must not be permitted to wash out or light up any locomotive unless examined by and certified to as competent by a District R.S. Superintendent, or Depot Foreman, who must forward the certificate setting out the date and result of the examination to the Chief Mechanical Engineer.

136. Every employe engaged in washing out a boiler must see that all scale and dirt is removed from the boiler barrel, the crown of the firebox and the water spaces.

137. The boiler, after washing out has been completed, must be inspected by a boilermaker, or where a boilermaker is not available, by the Officer- or Employee-in-Charge, who must satisfy himself that the crown of the firebox, boiler barrel, and water spaces and syphons (where fitted) are thoroughly clean, and the threads on the plugs and in the plug holes are clean and in good order.

At every AB examination the interior of each arch tube must be inspected by a boilermaker for signs of denting, pitting or bulging. (See also Instruction 146.)

138. Every Officer-in-Charge must make the necessary arrangements for a locomotive which is to be washed out to be left in such a position as will permit washing out to be performed without the necessity of moving it.

139. Every boiler which is to be washed out must, if practicable, be allowed to stand until the water in the boiler has become cold. The blow-off cock is then to be opened and the water run off. The boiler must then be washed out in accordance with Instructions 144 to 150.

140. When sufficient time for the water in the boiler to become cold is not available, and facilities for washing out with hot water are not provided, then the following method of cooling down the boiler must be adopted:—

The injectors must be put on and the boiler filled as high as possible. The steam pressure must be reduced to zero by allowing the steam to escape through the steam valves of the injectors; the jet or blower must not under any circumstances be used for the purpose of reducing the steam pressure.

The boiler must then be allowed to stand for as long as possible, but the minimum period must not

be less than 12 hours for H., S., and X. class locomotives, 6 hours for superheater locomotives of other classes, and 4 hours for all other locomotives, before cooling down is commenced. After this period of time has elapsed and the brick arch is reasonably cool, cold water may be gradually added through the top wash-out plug hole until the boiler is full, and then as much water as is flowing into the boiler must be allowed to flow out through the injector overflow pipes. Any other method of cooling down a boiler is prohibited.

Water must not be permitted to get below the crown of the firebox until the boiler is properly cool. Washing out must then be carried out in accordance with Instructions 144 to 150.

141. At any Depot where facilities for washing out with a hot water engine are provided it is not necessary for the boiler which is to be washed out to stand until it is cool, but the injectors must be put on and the boiler filled up as high as possible. The steam pressure must be reduced to zero by allowing the steam to escape through the steam valves of the injectors. The jet or blower must not under any circumstances be used for reducing the steam pressure. When the steam pressure has been reduced to zero the top wash out plug must be removed and the nozzle of the hose from the hot water engine inserted. The boiler is then to be washed out in accordance with Instructions 144 to 150.

142. After washing out has been completed and the boiler has been inspected and passed by a boilermaker or the Officer-in-Charge the plugs must be at once replaced and the boiler filled with hot water.

143. Before washing out is commenced the Big Ends, Side Rod Bushes, and Driving and Trailing Axle Boxes must be covered with a bag or piece of tarpaulin. The Rubber Hose or other protective devices must be also placed in position.

144. The washout plugs which must be removed on the occasion of each washout and through which washing out must be carried out are indicated below:—

Location of Washout Plug.	At each Washout.	
	H, S and X.	Other Classes.
Arch Tubes ..	Removed (at every AB exam)	} Not fitted
Syphons .. ..			Removed ..	Not fitted
<i>Firebox Plugs in Cab.</i>		
Back Plate Corners, Upper	Removed ..	Removed on E and Y
Back Plate Corners, Lower	Removed ..	Removed. (E and Y excepted)
Back Plate Centre, Upper	Not fitted ..	Removed on D4, E, and Y.
Back Plate Centre, Lower	Removed where fitted	Removed. (D4, E, and Y excepted)
Firebox Crown	Removed ..	Removed
Firebox Filler	Removed ..	Removed
<i>Plugs outside Cab.</i>		
Boiler Barrel, near top of Firebox	Removed X class so fitted	Not fitted
Firebox Crown	Removed where fitted	Not fitted
Firebox Shoulder ..	Removed .. where fitted	See operation No. 4
Firebox at Hand Rail Level	Removed ..	Removed
Combustion Chamber ..	Removed ..	Not fitted
Side Water Space ..	Removed ..	Removed
Throat Plate	Not fitted ..	Removed
Front Corner	Removed ..	Removed
Bottom of Boiler Barrel ..	Removed ..	Removed where fitted
Top of Leading Course of Barrel	Removed ..	Removed (E, R, T, and Y excepted)
Smoke Box Tube Plate	Removed ..	Removed

145. The Rotary Cleaner must be regularly used in each Arch tube at every ABC examination, and also

at intervening examinations if the condition of the interior of the tubes in regard to the presence of scale demands it.

The Rotary Cleaner must be used before washing out is commenced, and care must be taken to see that the rotary portion of the Cleaner always remains within the tube while it is being used.

146. After the Arch Tubes have been cleaned out an inspection of the interior of the tubes must be made by a boilermaker in order to see that the work has been properly carried out. Inspections should also be made by the Officer-in-Charge whenever possible.

147. The nozzles which are to be used for washing out are as follows (see diagrams on pages 82 and 83):—

Number of Nozzle.	Description of Nozzle.	Where Used.
No. 1 ..	Long Bent Nozzle 5' 0" long, angle of bend 30°	Washing down Firebox crowns; Syphons; back of Smokebox tube plate and bottom of tubes from Smokebox; Boiler Barrels
No. 2 ..	Short Bent Nozzle	Washing out back water spaces; Firehole ring (Top and Bottom); Combustion Cham- bers; Side Water spaces; Front water space at Throat Plate
No. 3 ..	Short Straight Nozzle 1' 6" long	Side water spaces; Crown of firebox; filling up boiler
Nos. 4 and 5	R. and L.H. Boiler Barrel Nozzle 5' 6" long	Boiler barrel from plug holes at bottom of boiler barrel "N," "S," and "X" class engines
No. 6 ..	Special Bent Nozzle 13" long, angle of bend 90°, bend 4" long	Back corners "D4" engines
No. 7 ..	Long Straight Nozzle 10' 0" long	Boiler Barrel from Smokebox end if barrel is found to be blocked up
No. 8 ..	Double Bent ..	Boiler Barrel from Smokebox on engines with Self-cleaning Smokeboxes. To be used if No. 1 Nozzle cannot be used
No. 9 ..	Special Nozzle, end set at angle of 30°	Side water spaces on engines with plugs close to footplate
No. 10 ..	Long Straight Nozzle 3' 9" long	Firebox Syphons

In order to wash down as large an area as possible, the Bent Nozzles, Nos. 1 and 2, must be given a rotary movement, and at the same time moved slowly backwards and forwards.

A mark has been provided on the screwed portion of the bent nozzles in order to indicate the direction of the flow of water.

148. A Brass Rod must be used in the front firebox corner plug holes during each washing out operation for the purpose of removing scale and sludge.

149. At every AB examination the boilermaker making the Boiler examination must work the Long Brass Rod, which is specially provided for the purpose, through the bottom wash-out plug holes in the smokebox tube plate to ensure that there is no accumulation of scale and sludge in the barrel, particularly about the throat stays to the firebox tube plate.

150. The method of washing out and the sequence of operations as set out hereunder must be carried out on every locomotive except where any operation is shown to be limited to certain classes of locomotives.

Operation No.	Section of Boiler.	Nozzle to be Used.	Where Used.
<i>Firebox—From inside Cab.</i>			
1	Firebox Crown	No. 1 (Long Bent) See page 83 for method of washing out Syphons	Each washout plug hole located in the back plate at the firebox crown level. The scale and sludge to be washed towards the side water spaces. On A1, A2, D1, D2, and D4 boilers the filler plug holes
2	Top of Fire-hole ring	No. 2 (Short Bent)	Each of the arch tube cap holes or the washout plug holes in the back plate at the firebox crown level. The water must be directed on to the top of the firehole ring

Operation No.	Section of Boiler.	Nozzle to be Used.	Where Used.
<i>Firebox—From inside Cab.</i>			
3	Bottom of Fire-hole Ring and Back water space	No. 2 (Short Bent)	Each of the back corner plug holes. The water to be played across the back water space towards the opposite side, and towards the bottom of the fire-hole ring
4	Firebox Crown	No. 3 (Short Straight) See page 83 for method of washing out Syphons	On H, S and X classes all plug holes above the hand rail commencing from that nearest to the cab and working towards the smokebox. On other classes the plug holes at the hand rail level or where these holes cannot be used the shoulder plug holes. The water to be played on to the crown of the firebox towards the opposite side
5	Top of side water spaces and barrel	No. 2 (Short Bent)	In each of the plug holes and in the same order as laid down in Operation No. 4 and the water played in all directions. From the front plug holes the water is to be directed along the top of the tubes towards the smokebox for at least two minutes on each side
6	Side Water Spaces	No. 2 (Short Bent)	Each side water space plug hole situated at about footplate level. The water to be played in all directions

Operation No.	Section of Boiler.	Nozzle to be Used.	Where Used.
7	Leading Course of Barrel	No. 2 (Short Bent) No. 3 (Short Straight)	Each nozzle is to be inserted in the plug holes above the hand rails at the front end of the boiler barrel. The bent nozzle is to be given a rotary movement
8	Combustion Chamber (H, S, and X Classes)	No. 2 (Short Bent)	The plug hole located in the barrel in front of the throat plate and towards the bottom of the boiler. The water to be played in all directions
9	Barrel and Tubes from Smokebox End	No. 1 (Long Bent) or No. 8 (Double Bent)	Each of the smokebox washout plug holes. The nozzle must be moved slowly backwards and forwards, and also given a combined rotary and side movement for the purpose of cleaning out as large an area as possible
10	Boiler Barrel (Engines with plugs in the bottom of the boiler)	Nos. 4 and 5 (Boiler Barrel)	The nozzle with the outlet facing towards the firebox must be inserted in each of the plug holes located at the bottom of the boiler barrel commencing with the plug hole nearest the smokebox and working towards the firebox. The screwed end of the nozzle must be given as much fore and aft movement as possible
11	Boiler Barrel blocked up	No. 7 (Short Straight)	Each plug hole in the smokebox

Operation No.	Section of Boiler.	Nozzle to be Used.	Where Used.
12	Arch Tubes (H, S, and X classes)	No. 3 (Short Straight)	Before the washing out of the arch tubes it commenced the frons arch tube plug caps must be replaced The nozzle must be inserted in each of the arch tubes and the tubes thoroughly cleaned out
13	Front Water Space at Throat Plate (Except H, S, and X classes)	No. 2 (Short Bent)	Each plug hole in the throat plate (where fitted). The water to be played in all directions
14	Side Water Spaces from Cab	No. 3 (Short Straight) (On D4 engines Special Bent nozzle No. 6)	Each of the lower corner plug holes in the back plate or on E. and Y. class engines the upper plug holes. Any scale or sludge deposited during washing out to be washed forward towards the front corner plug holes
15	Replacement of Plugs and Filling up	No. 3 (Short Straight)	After the boiler has been washed out in the manner laid down and has been inspected by a boilermaker, or Employe in charge, the wash out plugs and the syhon and arch tube plugs must be greased, replaced and tightened up. The boiler must then be filled to half a glass of water

151. All equipment such as spanners, nozzles, and washout rods, must be gathered up after use and placed in a locker. Hoses must not be left lying about the

shed, but should be coiled and placed around the wash-out hydrants, or on racks provided for the purpose. The Rotary Cleaner, after use, must be cleaned, inspected, oiled, and placed in the box provided, and returned to the Leading Hand Fitter's Store.

All equipment must be regularly inspected by the Officer-in-Charge, and maintained in good condition, particular care being exercised to see that leakage of water through faulty joints does not occur.

152. The method of using the Hot Water Plant at Geelong for washing out and refilling locomotive boilers with hot water is as follows:—

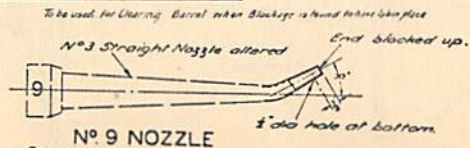
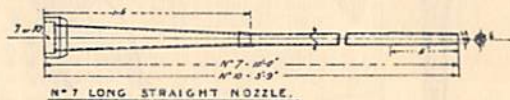
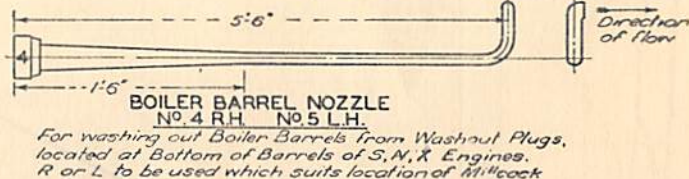
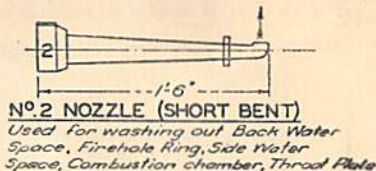
When the fire has been drawn the blow-off cock on the boiler must be attached by the special flexible metallic hose to the drop pipe of the Main Blow-out Line of the plant. The blow-off cock is then opened and the steam and water from the boiler pass along the Main Blow-out Line into a filtering and separating chamber; and thence into the Wash-out Water Tank. While the boiler is being emptied the Cut-off Cock on the Overhead Main must be closed, and care must be taken to see that it is kept closed whilst the washing-out is being performed, so that cold water cannot possibly be forced into the hot boiler.

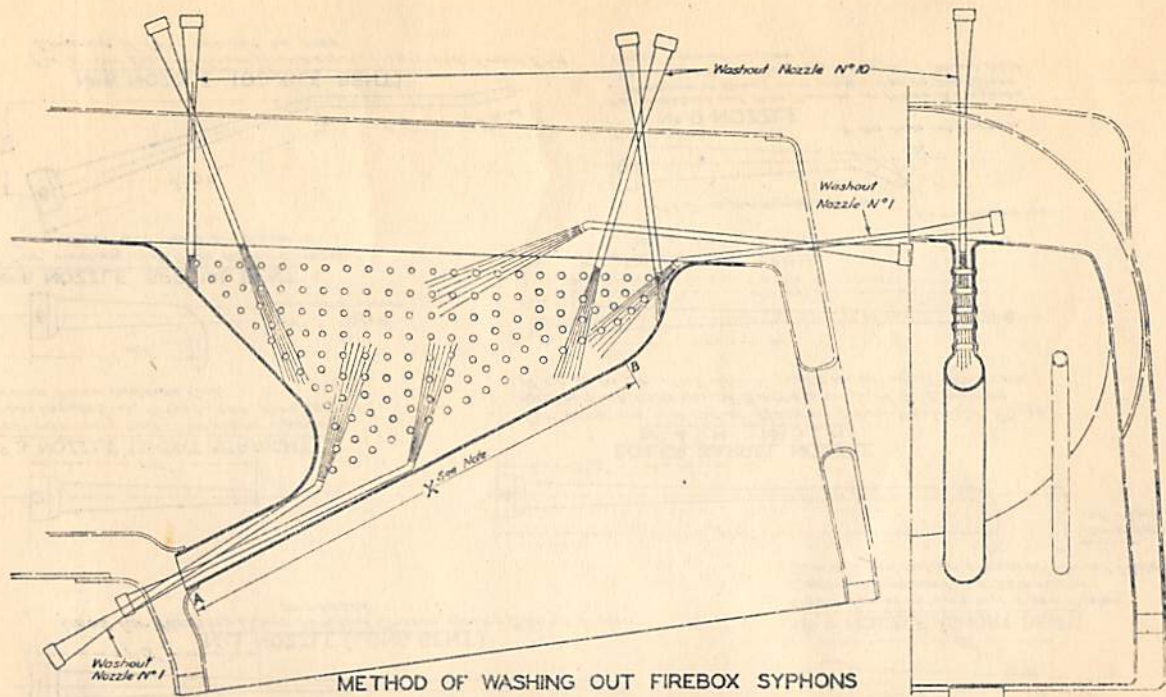
Both pumps must also be started to work slowly to ensure a thorough circulation of hot water throughout the plant. When the contents of the boiler have been discharged the blow-off cock on the locomotive must be closed, and the end of the metallic hose must be disconnected from the Main Blow-out Line and connected to the drop pipe of the Filling Line.

The washing-out hose is then connected to the drop pipe of the Washing-out Line, and, after making sure that the hot water is circulating properly, the boiler must be washed out with hot water in accordance with Instruction 150.

After the washing out has been completed and the boiler has been inspected and passed by a boilermaker or the Officer-in-Charge, the plugs must be replaced and the boiler at once filled, through the blow-off cock, with hot water from the Filling Line.

LOCOMOTIVE BOILERS WASHING OUT NOZZLES





METHOD OF WASHING OUT FIREBOX SYPHONS

When engines fitted with firebox syphons are sent into service after repairs to the boiler or firebox the syphons are to be thoroughly inspected after each trip for the first three trips and any drillings that may have worked round to the syphons are to be removed. The syphons are to be thoroughly washed out whenever the boiler is washed out. The lower portion designated "X" between points "A" and "B" should receive special attention because of solids settling along this surface and its nearness to the hottest part of the fire. Washout holes are provided in the crown, back, and throat plates of the boiler for inspection and the insertion of nozzles. Washout nozzles Nos. 1 and 10 are to be used as shown on this diagram.

ELECTRIC LIGHTING EQUIPMENT.

153. The electric lighting equipment consists of a combined single stage steam turbine and electric generator termed the turbo-generator, situated on the top or side of the firebox of the locomotive. A headlight, marker lights on the front of the engine and rear of the tender, cab lights and the necessary switches, wiring and fittings.

The generator has a capacity of 500 watts and operates at 32 volts at a speed of 3,600 revolutions per minute, with a minimum steam pressure of 125 lb. on locomotives.

The speed of the turbine is automatically controlled by a governor valve which is operated by two governor weights working on the turbine shaft.

Steam is taken from the dome by an internal pipe to a steam valve situated on the top of the firebox. This valve is fitted with a spindle and wheel which is operated from the cab and when opened permits steam to pass to the turbine through a stop valve situated near the point of entry of the main steam pipe to the turbine. This valve must remain fully open except when attention is necessary to the turbo-generator.

154. The headlight and dimmer light are controlled by a three-position switch situated on the side of the cab near the Driver's seat.

The relative positions of the switch handle and the lights controlled are as follow:—

Handle in full back position—Headlight on.

Handle in middle position—Headlight and Dimmer off.

Handle in full forward position—Dimmer on.

155. Marker lights are placed at the sides of the smokebox and on the back of the tender. These are of two types as shown hereunder:—

(a) Combined oil and electric marker lights are fitted on some locomotives. The electric

light is controlled by a tumbler switch inside the lamp. The colour of the light is changed by operating a red shade inside the lamp.

- (b) Electric marker lights are fitted on other locomotives. These are controlled by a thumb switch at the base of the lamp. The colour of the light is changed by operating a small lever at the side of the lamp.

156. The cab and number lights are in continuous circuit with the generator and should light automatically when the turbo-generator is started.

157. The driver must test the equipment by slowly opening to its fullest extent the steam valve on the top of the firebox. Steam must be admitted gradually to allow the condensed steam to escape through the drain pipe. This test must be made with a steam pressure of not less than 125 lb.

158. If the 250 Watt lamp in the headlight fails and another is not available, a spare lamp of a smaller wattage but of the same voltage may be used to replace it.

In the event of a 25 Watt lamp being defective a lamp can be transferred from one of the marker lights not in use. The lamps are fitted with a screw cap and are removed from the socket by unscrewing to the left.

159. The reflector in the headlight is to be cleaned by a Train Lighting mechanic. The surface of the reflector is silver-plated, burnished to produce a brilliant surface, and is very easily damaged. For this reason Enginemen must not attempt to wipe it. The door of the headlight is designed to keep the headlight air tight, and Enginemen must see that the thumb screws that fasten the door do not become slack.

160. The electric lighting equipment is to be examined in a similar manner to other locomotive parts as set out in Instructions 131, 132 and 133

The examinations as set out hereunder are to be carried out by an employe of the Train Lighting Staff, but if such an employe is not available then the "A" and "AB" examinations only may be carried out by a specially selected Running Shed Fitter.

"A" Examination.—Run turbo generator, check voltage and lamps.

"AB" Examination.—Lamp fittings, clean turbo generator outer casing. Replenish oil in sump of turbo generator.

"ABC" Examination.—All conduit piping, connections, fittings, fuses, headlights, marker lights. Clean marker light and headlight glasses. Reflectors to be washed and cleaned with chamois.

Pyle Turbo Generator.—Dismantle and clean machine, remove shaft, inspect bucket wheel, examine governor, weights, weight sleeve, anti-friction ring and its position with setting of valve. Check armature, field coils, carbon brushes, spring tension, connections. Clean commutator. Re-assemble and test at full steam pressure.

Stone's Turbo Generator.—Dismantle, clean and examine governor valve and strainer. Examine and test governor control, rocker, and carbon thrust block. Clean and test oil wells. Re-assemble and test at full steam pressure.

161. If the turbo-generator does not start when the steam valve in the cab is opened, an examination is to be made by a Train Lighting Mechanic or Running Shed Fitter as shown hereunder:—

- (a) See that the stop valve on the supply pipe to the turbine is fully open.
- (b) On a Pyle machine close the stop valve at the turbo-generator, unscrew the cap over the governor valve, take out the governor and

remove any foreign matter. Then test the governor valve for sticking by moving it up and down.

- (c) On a Stone machine test the governor valve by moving the rocker in and out.

162. (a) If the turbo-generator slows down when lights are switched on it may be due to low boiler pressure or the governor valve sticking in its cage. In the latter case examine and test the valve as set out in clauses (b) and (c), Instruction 161.

(b) If the turbo-generator races when the headlight is switched off it may be due to the governor valve sticking to its cage, or steam escaping past it, or alternatively the governor valve might require adjustment.

163. Sparking at the commutator brushes on a Pyle machine is caused by:—

- (a) The mica between the commutator segments being too high. The mica strips should be $\frac{1}{64}$ th. inch below the surface of the commutator.
- (b) Insufficient brush spring tension or spring broken. The proper spring tension is $1\frac{1}{4}$ lb. measured on the tips of the springs in the position at which they rest on the brush.
- (c) Brushes worn too low.
- (d) Commutator surface or brushes rough.
- (e) Commutator worn out of true.

164. In the case of failure or partial failure of the lights, the following examination is necessary:—

- (a) Examine the wire connection at the terminal of the generator for contact;
- (b) Test each Marker light and cab light by disconnecting the wire at the rosette to each light in turn. On locating the defective wire it is to be left disconnected.

165. In the event of a defect occurring in the electrical equipment which renders the Headlight or the Marker lights inoperative at a Depot or Sub-Depot, the following procedure must be adopted:—

- (a) Any locomotive fitted with electric Headlight equipment booked to run any portion of its trip during darkness must not, except in case of emergency, leave the Depot or Sub-Depot until the defect in the Headlight has been rectified. If the defect in the electric Headlight cannot be quickly remedied arrangements must be made to supply another locomotive, but if this is not practicable then the locomotive may be run with the dimmer light in use. If this light is also defective a Standard Kerosene Head Lamp must be prepared and placed on the lamp bracket on the front of the locomotive.
- (b) If the defect is in one or both of the Marker lights and such defect cannot be expeditiously remedied, but the Headlight is in proper working condition, then, if the locomotive is fitted with combined oil and electric lights, it may go into running. If fitted with ordinary Marker lights and no other suitable locomotive is available two Standard Kerosene Head Lamps are to be secured in positions similar to the Marker lights, and arrangements must be made to have the defect remedied at the earliest possible moment.

166. In the event of a defect occurring in the electrical equipment which renders the Head or Marker lights inoperative whilst the locomotive or train is in running the following procedure is to be adopted:—

- (a) Should the electric Headlight fail on the road the locomotive or train must be immediately stopped and the Driver must properly prepare the Standard Kerosene Engine Head

Lamp, which forms part of the Locomotive Equipment of all engines fitted with Electric Headlights, and place it in the lamp bracket on the front of the locomotive. The lamp must be trimmed and regulated to give as much illumination as possible. If the Marker lights, either oil or electric, are in operation the locomotive or train may then proceed at normal speed.

- (b) If the defect is in one or both of the Electric Marker lights but the Headlight is in proper working condition then the locomotive or train may proceed under ordinary conditions, but special care must be taken in approaching or moving about station yards when the Headlight is dimmed. The defect in the Marker light or lights must be remedied as soon as practicable.

If the locomotive is fitted with combined Oil and Electric Marker lights the electric lamp must be unscrewed from the holder, the font removed by releasing the clip and filled with kerosene. It must then be placed in the recess at the bottom of the Marker light, lit and properly trimmed.

- (c) If the Headlight and the Marker lights fail the kerosene oil lamp is to be used as set out in clause (a), and the locomotive or train must proceed cautiously through the section at a speed not exceeding 30 miles per hour. It must approach every Level Crossing and Station cautiously at a speed not exceeding 10 miles per hour, and the Driver must sound the engine whistle practically continuously when approaching a Level Crossing or Station.
- (d) On arrival at a Depot or Sub-Depot, where suitable Head Lamps can be obtained, sufficient of these lamps must be secured on the

front of the locomotive to enable three headlights to be displayed. The locomotive or train may then proceed at normal speed.

- (e) In the event of the Driver not being able to obtain the required number of suitable Head Lamps to equip the locomotive he must carry out the special instructions shown in clause (c) of this Instruction.
- (f) As soon as possible after the failure occurs the Driver must notify his Supervising Officer of the occurrence and arrangements must be made for a relief locomotive, if the circumstances warrant it.
- (g) If the failure occurs on an Express or Passenger train a suitable change over of locomotives must be arranged as early as practicable.

167. In the event of a defect occurring in the electrical equipment of a Petrol Electric Rail Motor which renders the Headlight inoperative at a Depot or Terminal Station, the following procedure must be adopted:—

- (a) If any portion of the scheduled trip of the Rail Motor will be run during darkness the defect in the Headlight must, if practicable, be remedied before the Rail Motor is allowed into traffic.
- (b) If the defect cannot be remedied in time for the Rail Motor to run its scheduled trip and another suitable Rail Motor is not available, then the two spare oil headlamps in the car must be properly prepared and placed on the lamp brackets at the leading end of the car. The lamps must be trimmed and regulated to give as much illumination as possible.

168. In the event of the Headlight becoming defective whilst the Rail Motor is in running, the following procedure must be adopted:—

- (a) Should the Electric Headlight fail on the road the Rail Motor must be immediately stopped, and, if the defect cannot be quickly remedied, the two spare oil headlamps must be properly prepared and placed on the lamp brackets at the leading end of the car. The lamps must be trimmed and regulated to give as much illumination as possible.
- (b) On arrival at a Depot every effort must be made to have the defect in the Headlight remedied before the Rail Motor is permitted to continue its journey.

169. In all cases of defects occurring in the electrical equipment the Train Lighting Inspector (Carlights) must be advised by wire.

SPEED RECORDERS.

170. Every Speed Recorder must be thoroughly overhauled every two years and is to be forwarded to the Workshops Manager, Newport, on receipt of instructions to that effect from the office of the Chief Mechanical Engineer where a record of every Speed Recorder issued from and returned to stock is maintained.

171. When a Speed Recorder is transferred from one locomotive to another for any reason, or is sent to Newport Workshops for overhaul or repairs, it must be reported to the office of the Chief Mechanical Engineer on Form R.S. 211.

172. Every Speed Recorder requiring repairs is to be removed from the locomotive and replaced with the spare recorder at the Depot. The defective recorder is to be properly packed in the box provided for the purpose, marked "with care" and waybilled per passenger train to the Workshops Manager, Newport,

who is to arrange to supply another machine to the Depot concerned to replace the recorder which has been placed in service.

173. When a locomotive is taken into any Workshop for overhaul, the number of the Speed Recorder on the engine must be forwarded to the office of the Chief Mechanical Engineer in order that the date of the previous overhaul can be ascertained and instructions issued accordingly. The Speed Chart must be removed and forwarded to the Supt. of Loco. Running.

174. Every Speed Recorder must be examined and the used portion of the chart removed fortnightly; the chart is to be waybilled and forwarded to the Supt. of Loco. Running or the District Rolling Stock Superintendent. When cutting off the used portion of a chart a margin of at least one inch must be allowed to ensure that the record of the last trip is complete. The cardboard ferrule on the receiving spool must be examined to see that it does not bind tightly on the spool. It must be just tight enough to provide sufficient tension to wind the used portion of the chart and to slip when all slackness is taken up. A tight ferrule will cause the chart to be torn by the teeth of the feeding drum. When a chart has been fixed in a machine the Time and Speed metallic pencils must be gently placed in contact with the chart, with the Speed pencil resting on the zero line. It is occasionally necessary to give the clock winding handle one or two turns to bring the pencil to Zero. The Time pencil should agree with the pointer on the small dial.

175. When forwarding the Speed Charts taken out of the Recorders each fortnight Form R.S. 211 D showing the number of each locomotive in the district fitted with a Speed Recorder together with the period of running covered by each chart must be forwarded with the charts.

176. A spool must not be removed from or replaced in a Recorder while the locomotive is in motion. If a spool becomes jammed the locomotive must not on any account be moved until the Transmission Gear is disconnected or the Speed Recorder removed, otherwise serious damage will be caused.

177. Every recorder must be lubricated fortnightly with the special clock oil supplied for that purpose. The lubrication is effected by filling the small oil cup on the top of the Recorder. Ordinary clean lubricating oil is to be used on the bottom lubricator which supplies the driving spindle. Special care must be taken to see that the oil cup cover is always replaced after oiling.

178. The Speed and Time pencils must be adjusted frequently to ensure clear and unbroken lines being made on the chart, care being taken to see that foreign matter is not adhering to the pencils. A metallic pencil is lengthened out by slackening the check-nut, unscrewing the pencil about $\frac{1}{8}$ inch and then resetting up the check-nut. Pliers should not be used for this purpose as the brass pencil holders are sometimes bent up or down thereby; sufficient force can be applied with the finger and thumb on the check-nut. When new pencils are fitted care should be taken to see that they do not stand out too far from the holder. All adjustments must be made to the gauge provided for the purpose.

179. The following duties in connection with the Speed Recorder and Transmission Gear are to be performed by every Driver:—

- (a) He must, before leaving the shed, examine the Transmission Gear and oil the gear boxes, shaft and driving pins with ordinary bearing oil.
- (b) He must see that there is sufficient length of chart in the Recorder for the journey, and wind up the Recorder clock to ascertain if it is in proper working order, and to record

any standing time between the Running Shed and the departure of the train. For this purpose the winding handle must be given an appreciable number of turns.

- (c) If the Recorder is not in proper working order, or there is any doubt as to whether there is sufficient paper to complete the chart for the round trip on which he is booked to run he must, before leaving the Depot at the commencement of a trip, report the matter on a Repair Card. An engine must not be permitted to go into service unless the Speed Recorder is functioning correctly and contains sufficient chart to complete the trip. The length of chart in the Recorder may be determined from the following table:—

Diameter of chart left on spool.	Measurement taken from chart roll to edge of spool.	Number of miles chart will run.
Inches.	Inches.	
1	$1\frac{3}{8}$	200
$\frac{15}{16}$	$1\frac{1}{8}$	150
$\frac{7}{8}$	$1\frac{1}{4}$	100
$\frac{13}{16}$	$1\frac{5}{8}$	50
$\frac{3}{32}$ (bare tube) ..	$1\frac{7}{8}$	0

At all Depots and Sub-depots a gauge is provided to determine when there is not sufficient chart on the spool for a distance of 200 miles.

The gauge, which is one inch between jaws, is to be applied to the unused spool of the chart by a member of the mechanical staff. If the gauge just spans the roll of chart there is sufficient chart remaining on the spool for 200 miles of running.

- (d) He must, just prior to commencing a journey or when relieving another Driver, write on

the back of the chart the following particulars (indelible pencil must not be used) :—

- (i) The date.
- (ii) Scheduled time of departure.
- (iii) Station from and to.
- (iv) Class of train: Passenger, Mixed Goods, Light Engine, Bona, &c.
- (v) Name of Driver.
- (vi) No. and class of engine.
- (vii) If the train is double-headed the Driver of the leading engine must include the number of the second engine, e.g., 876 A² second engine. The Driver of the second engine must show the number of the leading engine, e.g., 974 A² leading engine.
- (viii) If the train is assisted in the rear the Driver of the train engine must include the number of the banking engine and show whether it is running engine or tender first.
- (ix) Where a Mixed or Goods train is run without a four-wheeled vehicle attached, he must also record on the chart

ROLLING STOCK BRANCH BOOK OF INSTRUCTIONS.

Instruction 179 is amended by the addition of Clause (xi) which is to be inserted in page 98 of the above book.

(xi) When a train is brought to a stand in a section for any reason other than the aspect of fixed signals, the driver must briefly write the reason for the stop on the back of the speed chart.

- (f) Whenever a train is delayed at a Station or engaged in short shunting movements, he must rewind the Recorder clock in order that the full time occupied may be recorded.

180. For testing the accuracy of the speed indications a particular part of the road should be chosen where the speed of the engine is fairly uniform.

The following table will be useful when testing the accuracy of Speed Recorders:—

Over a Distance of Half-a-Mile.	Speed.
Seconds.	Miles per hour.
30	60
33	55
36	50
40	45
45	40
51	35
60	30
72	25
90	20
120	15
180	10
360	5

181. Tampering with any Speed Recorder, or with any Speed Chart, is prohibited.

182. Whenever a locomotive, fitted with a Speed Recorder, has been concerned in a collision, derailment, or any other unusual occurrence, the Speed Chart must be removed by the first Rolling Stock Officer arriving at the scene, and it must be placed in safe custody so that it will be available when required.

ENGINE REPAIR CARDS.

183. At all Depots where Engine Repair Cards are in use for the purpose of booking repairs the following instructions are to be carried out:—

- (a) All engine defects, parts requiring repacking, sand boxes to be filled, or other items requiring attention formerly entered in the

Repair Report Book or Packing Book are to be entered on a Repair Card. A separate card is to be used for each engine.

- (b) During the day these cards will be obtainable at the office of the Depot Foreman, and all cards on which entries have been made must be returned to the Clerk in charge at that office. During the afternoon and night shifts the Night Depot Foreman or Charge-man, as the case may be, will issue and receive all repair cards.
- (c) Every Engineman submitting a repair card must, in addition to the particulars of the repairs required, enter on the card the engine Number, Trip, Road on which the engine is left, and the time the card was handed in, and affix his signature immediately following the entry of the repairs.
- (d) Every Driver, Hostler, or other employe engaged in the stabling or preparation of a locomotive must enter on a repair card all defects observed during the time the locomotive is in his charge.
- (e) Every Driver must enter on a repair card details of all defects observed on a locomotive during a trip, or whilst it is in his charge, together with particulars shown in Clause (c) of this Instruction and hand it to the Clerk in charge of repair cards, the Night Foreman or the Chargeman before leaving duty.
- (f) When a Driver is relieved on the road and has to report on the condition of the engine, he must enter on a repair card the items of repair requiring attention, affix his signature and hand the card to his relief, who in turn, will add thereon his report, if any, sign the card, and on his return to the Shed, hand it to the Clerk, Night Depot Foreman, or Chargeman.

- (g) A Driver running into a Depot other than his Home Depot and having repairs to book against his engine must obtain a card from the Clerk, the Night Depot Foreman, or the Chargeman, enter thereon the necessary particulars, sign his name, and return the card to the Clerk, Night Depot Foreman, or Chargeman as the case may be.
- (h) Any Driver who has left his engine in the siding and has not examined or only partially examined the engine, must in either case enter on a repair card any defects observed, that the engine has not been examined or has been partially examined and the road on which the engine is left and hand it to the Clerk, Night Depot Foreman, or Chargeman, as the case may be.
- (i) Any Driver desirous of ascertaining particulars of repairs, if any, booked against an engine on which he is about to leave the shed, will be permitted to view the repair card of the particular engine in respect of its previous trip, on making application to the Clerk, Night Depot Foreman or Chargeman.
- (j) Following on the receipt from an engine driver, hostler or other employes of an engine repair card on which are shown details of repairs, packing, etc., requiring attention in respect of an engine, yellow dockets known as "Engine Repair Dockets" will be prepared by the Clerk, Night Depot Foreman, Chargeman or Officer-in-Charge, as the case may be, setting out thereon the nature of the repairs, etc., booked.

- (k) On Day shift a repair docket for each entry on a card will be issued to the Sub-Foreman or the Leading Hand Fitter who, in turn, will require to hand it to the members of the mechanical or shed staffs to whom he entrusts the carrying out of the work shown on the dockets. When the repairs, etc., have been completed the employe must write on each docket details of repairs effected, or work performed, the time the work was completed, sign his name and return the dockets without delay to the Sub-Foreman or the Leading Hand Fitter.
- (l) The Sub-Foreman or the Leading Hand Fitter, on return of these dockets, must initial same certifying to the performance of the work in question and return them without delay to the Clerk at the sign-on window.
- (m) On Afternoon and Night shifts repair dockets must be issued direct to the mechanics or shed hands by the Night Depot Foreman, Chargeman, or Officer-in-Charge, and on each docket the employe concerned must write the details of the work executed, the time completed, sign his name, and return the dockets to the Night Depot Foreman, Chargeman, or Officer-in-Charge.
- (n) No repair work is to be undertaken without an authorizing docket, and in order that repair work, other than that booked by a driver or hostler, against an engine shall be covered by an engine repair card and docket, the Sub-Foreman or the Leading

Hand Fitter or Officer-in-Charge must, in respect of all repair work decided on by himself or reported as necessary by a member of the mechanical or shed staff, enter on an engine repair card, in respect of each engine, details of such repair work, sign his name, and forward the card to the Clerk who will prepare and issue dockets in the usual way. Any employe detecting repair work requiring attention must therefore report the details to the Sub-Foreman or the Leading Hand Fitter or Officer-in-Charge.

- (o) All repair dockets covering repair work that could not be performed before the engine returned to traffic, but has been signed off on such dockets as "Fit to Run" must be held until the engine has been returned to the shed when the dockets will be re-issued to the Sub-Foreman or the Leading Hand Fitter in order that the repairs can be effected.
- (p) Every repair card must be carefully checked with the yellow dockets by the Clerk in charge of repair cards and he must see that each entry on the card is covered by a yellow docket properly certified to by the Officer or Employe in charge of the Depot when the repairs were effected. If any entry on the repair card is not so covered he must immediately report the matter to the Depot Foreman. As each repair card is completed it must be filed in the cabinet provided for this purpose.

CARS, VANS, AND WAGONS.

184. No car, van or wagon must be permitted to leave a Workshop or Depot after a general overhaul unless it be fit to run for the full period between lifts, as shown in instruction 186 for the class of vehicle concerned, except as provided for in clause (c) of Instruction 185.

185. Every car, van or wagon must be periodically lifted and all working parts of the undergear, such as wheels and axles, axle box parts, springs, bogies, brake, draw and buffing gear, etc., must be thoroughly examined, and as indicated hereunder brought to a condition which will permit of the vehicle complying with Instruction 184.

No vehicle is to be regarded as being lifted unless, in addition to examination, the following work has been completed:—

- (a) Scored journals to be reconditioned; journal bearings (brasses) which have a total end wear of $\frac{1}{8}$ inch, are thin or are in other respects defective, to be re-metalled or renewed and refitted, wool rolls and oil to be renewed on all axles of the vehicle. Worn brake pins (including all hanger pins of the split pin type through butterfly brackets which must be replaced with cotttered pins), cotters, split pins, brake blocks and hangers, draw gear pins and defective springs to be renewed, and springs correctly re-seated. "W" guards or horns to be corrected to gauge and squared. The triple valve must be removed from the vehicle and submitted to the prescribed test on the standard Triple Valve Test Rack.

- (b) At all Workshops, and at Depots where facilities are available the following, in addition to the work covered by sub-section (a), must be done:—All worn parts of the undergear to be reconditioned or renewed, including annealing or normalizing of parts which have been subjected, during reconditioning, to heat.
- (c) At Depots where facilities are not available for effecting a full lift as indicated by sub-section (b), a vehicle will be regarded as being lifted when all work covered by sub-section (a) is carried out, but it will be necessary for the Train Examiner, Running Gear Repairer, or other employe responsible for the lift to indicate clearly on Weekly Return No. R.S. 288, which is furnished to the Workshops Manager, North Melbourne, that the draw gear, etc., has not been reconditioned or renewed, so that the vehicle may be listed for attention by North Melbourne at a later date.
- (d) In all cases where a vehicle comes under notice as overdue for "lifting," it is to be green carded for attention to the nearest Depot where such attention is permissible. In the case of a loaded vehicle, green card to the Workshop or Depot nearest the destination of loading, or, alternatively, if the vehicle requires attention for a hot box or other urgent repairs, arrangements to be made for the transference of the loading in order that it may receive necessary attention and "All Round Lifting" if due for same.

Only after such action as covered by the above instructions has been complied with may the old lift date on the vehicle be altered to the new date.

186. The periods between lifting are as shown in the following table, but whenever any vehicle is being re-wheeled the journals, journal bearings (brasses), journal bearing wedges, wool rolls and oil must, in addition to the periodical examination, be examined and dealt with as indicated above:—
Every—

	To be lifted:— every 150,000 miles.
V. and S.A. Joint Stock Car and Van ..	..
Car or Van permanently on the Melbourne-Mildura run ..	.. 12 months
Avoca, CE Van other than joint Stock C Van with other than No. 5- $\frac{1}{2}$ Axle boxes	.. 18 "
AS, BS, Spirit of Progress Parlour and Diner, Wimmera, Mitta Mitta, Moorabool, and Tanjil Cars and CS and DS Vans ..	.. 2 years
Campaspe, Goulburn, Hopkins, State No. 1 and No. 4, Norman, Carey, Melville, Victoria. E Car other than those indicated herein ..	.. 2 "
Parlour Cars Murray and Yarra, every Bogie Car, excepting Rail Motors, Suburban and Other Cars indicated herein ..	.. 2 $\frac{1}{2}$ "
CW, CV, Z Van, also C Van with No. 5- $\frac{1}{2}$ Axleboxes ..	.. 2 $\frac{1}{2}$ "
Bogie Wagon and Horsebox with inside suspension links (covers TT, UB, also some QR and FF) ..	.. 2 $\frac{1}{2}$ "
TT Wagons Nos. 4, 8, 15, 16, 17, 18 (used for bulk mails) ..	.. 18 months
Tank Wagon other than Water Tanks ..	.. 3 years
Fixed Wheelbase Car used on passenger or mixed trains, also MT Car ..	.. 5 "
Wagon, other than indicated here ..	.. 5 "
E, J, K, and N Wagon, Water Tank, W and WW, and every Van or Wagon used exclusively on the Overhead Equipment and Break-down trains ..	.. 7 "
T Wagon ..	.. 6 "
Terminal and Weighbridge test Wagon ..	.. 10 "
Surburban Cars, Rail Motors and all Narrow Gauge stock must be lifted and examined when wheels or journal bearings (brasses) require attention.	

* NOTE.—Should any of these vehicles run 250,000 miles in less than any lift period of two years it shall be regarded as having completed the full period and be shopped accordingly.

187. At the completion of each lift the lift date is to be stencilled in its correct location on each side of the vehicle.

188. When a car, van or wagon has to be lifted to change a wheel and axle, axlebox, journal bearing (brass), journal bearing wedge, "W" Guard or allied part, the responsible Fitter, Running Gear Repairer, or Train Examiner must carefully examine all such parts of the undergear for traces of unequal or abnormal wear, such as the axlebox running against the axle or boss of wheel, the bearing having more worn off one edge or one end than the other, or the journal bearing wedge not seating correctly on the journal bearing and crown of the axlebox. The "W" guard or horns must be carefully gauged for correct distance apart, and, if necessary, squared. If, after the "W" guards have been squared and the brass properly fitted in the axlebox and on the journal, the side springs do not fit truly into the spring shoe when the vehicle is lowered, the spring rest and buckle must be examined, and if the buckle is binding in the spring rest it must be chipped till it fits loosely and is bearing fairly on the bottom; the ends of the side spring will then fit properly into the shoe, and care must be taken to see that all the springs have the full camber. When springs of full camber are not available, the springs under the vehicle must be placed so that those of equal camber are put on the same axle.

189. Every car, van or wagon which has been lifted for any cause must have all wool waste packs or pads examined, and, if necessary, renewed, all pan bolts properly screwed up and the oil renewed, after which the pad date is to be stencilled on the underframe on each side of the vehicle. The pad date must also be recorded as above stated each time the wool waste pack or pad is renewed, and the oiling date chalked on the underframe at such time that oiling is carried out.

AMENDMENTS TO ROLLING STOCK BRANCH BOOK OF INSTRUCTIONS.

Page 90. Instruction 162.

At the end of clause (a) amend "Instruction 160" to read "Instruction 161."

Page 149. Instruction 271.

Amend the words "every six (6) months" to "every twelve (12) months."

Page 158.

Add the following as a new clause to Instruction 290.

(d) Special Care of Slewing Gear.

- (a) When using the slewing gear special care is to be taken to see that the engine crank shaft speed does not exceed 250 revolutions per minute.
- (b) When making a stop the jib shall be brought to rest slowly by the gradual shutting of the steam regulator valve.

Page 176.

Add the following items of equipment under "Lifting Gear."

AMENDMENT TO ROLLING STOCK BRANCH BOOK OF INSTRUCTIONS

To be inserted in lieu of Instruction 195 on page 108.

195. The axleboxes of all wagons must be oiled at least once in every month and the date of oiling and the station symbol must be recorded in the space provided on the underframe.

Train Examiners must regularly inspect vehicles on trains and in yards and oil any wagons found to be overdue.

196. When a vehicle is in bad condition, and requires repairs or overhaul, which the Train Examiner cannot undertake, a report, giving details of the repairs required, must be sent to his Officer-in-Charge, who must forward full reports to the Chief Mechanical Engineer.

197. All damage to rolling stock, whether caused by carelessness or otherwise, must be immediately reported by the Train Examiner to his Officer-in-Charge.

198. Every new and rebuilt wagon must be weighed and the correct tare weight in tons cwt. qrs. and lb., together with the date of weighing must be painted on both sides of the wagon before it is placed in traffic.

199. Every wagon which passes through at any Workshop or Repair Shop, for lifting or repairs which affect the tare weight, must be weighed, subject to the following conditions:—

(a) If a wooden wagon be so wet that it will not be possible to ascertain the correct tare weight, it must not be weighed unless the repairs or alterations effected are likely to alter the weight.

(b) Every wagon that has been subjected to repairs or alterations which are likely to affect the weight must be retared, wet or dry. If a wooden wagon be so wet that the correct tare weight cannot be ascertained, the new tare stencilled on it must have a distinguishing mark "X" painted alongside to indicate that the figures are only approximately correct. Every such wagon must be entered on Form T.R. 87, and the distinguishing mark "X" shown opposite each entry.

200. Every wagon bearing the mark "X" alongside the painted tare must, when loaded with grain for export, subject to Instruction 199, be retared after discharging, and the tare weight so ascertained shall be stencilled on it, and the distinguishing mark removed.

201. When a wagon bearing the distinguishing mark "X" is loaded with ordinary traffic to be weighed, the weigher must record such mark on the weighbridge ticket opposite the tare weight, also on the weighing returns to indicate that such tare weight is only approximately correct.

202. Every station equipped with a wagon weighbridge shall take steps to retare whenever practicable every wagon bearing the distinguishing mark referred to. Every station not equipped with a weighbridge, receiving a wagon bearing the distinguishing mark shall place a "RETARE" ticket on each side, and, if loading be not available for a truck weighbridge station, the Superintendent of Train Services must be wired to for instructions regarding its disposal.

203. When repairs which may affect the tare weight are carried out on a wagon at any location other than a Workshop or Repair Shop, the following procedure must be adopted:—

(a) If a wagon be empty and at a station equipped with a wagon weighbridge, the Train Examiner or other employe who effected the repairs must place one "RETARE" card on each side of the wagon, and hand to the Officer-in-Charge a notice that the wagon is to be retared before being put into traffic.

(b) If a wagon be loaded or at a station not equipped with a wagon weighbridge, the Train Examiner or other employe must, in order to indicate that the figures shown are approximate only, paint the distinguishing mark "X" alongside the tare weight figures.

204. The stencilled tare of a wagon includes the weight of two draw gear couplings. When one of these is missing, the following allowances are to be added to the gross weight, viz.:—

	qrs.	lb.
Shackle, pin and 2-link chain (11-ton trucks)	2	0
Clevis, pin and 2-link chain	2	0
Bail hook and 2-link chain	2	0
Three-link chain	1	14
Two-link chain	1	0
Screw coupling with shackle pin (complete)	2	21

Certain wagons are fitted with Ridge gear and the stencilled tare in such cases represents the weight of wagon with full Ridge equipment. When a portion of this equipment is missing the following allowances are to be added to the gross weight, viz.:—

	qrs.	lb.
Stanchion, Q wagons	2	14
Stinton type Ridge gear, Stanchion (one end). This applies to 11-ton and IA wagons (high sided) ..	1	0
Burns type Ridge gear, Stanchion (one end). This applies to I, IY, IZ, G, GY, and GZ wagons ..	1	14

205. Every wagon to be weighed must be uncoupled and stand at rest on the platform. It must be moved off the weighbridge platform by hand, or pinch bar if necessary, and not by contact with any other wagon.

206. When the gross weight of a wagon is greater than the weighing capacity of the weighbridge, or when the length is such that the wagon cannot be weighed in one operation, the weight of the different axles or bogies must be taken separately and each weighing recorded in the weighbridge book and totalled. Axles or bogies should be placed on the centre of the weighbridge platform.

207. Care must be exercised in order to ensure that wagons are passed over the weighbridge platform very slowly and that each wagon is clear of the platform before another wagon is placed thereon.

208. The weigher must see that every wagon is properly cleaned out before being placed on a weighbridge, and after the stencilling has been done, care must be taken to see that the correct tare weight has been painted on both sides.

209. Immediately a wagon is weighed the weigher must enter on Form T.R. 87, the date, number, class of wagon, old tare weight, the correct tare weight, and, if necessary, the distinguishing cross (see Instruction 199, Sub-clause (b)), and must hand the form to his immediate Superior Officer, who must forward it on the same day to the Supervisor of Weighing.

RAIL TANK CARS.

210. In the event of the derailment of or damage to a Rail Tank Car containing Petrol or Kerosene every precaution and care must be taken to ensure safety, bearing in mind the extremely inflammable nature of the contents. No discrimination must be made between a loaded and an empty Rail Tank Car.

211. Every effort must be made to keep all members of the public at a safe distance from the Car concerned. The assistance of the Police should be obtained whenever practicable. The Car involved must be isolated from the remainder of the train as soon as possible.

212. Special action must be taken to guard against ignition from fire, hand lamps and naked lights of any description; they must not be brought within the vicinity of the Car. The lighting of matches and smoking must be strictly prohibited. Engines must not be allowed to approach close to the Car *especially on the Windward side.*

Any liquid which has been spilled should be absorbed in sand or earth. Spreading of the liquid should be prevented by collecting it in any vessels which may be available, or drawing it into a hole or trench to be dug at a safe distance from the line.

It must not, however, be drained into a sewer or a stream of water, as water will not quench an inflammable liquid fire; even if not alight the liquid is still dangerous.

If the liquid is alight an attempt should be made to smother it by the use of sand, earth or wet bags.

The prevention of fire is of more importance than the saving of the contents.

213. A certificate *must be obtained* from the responsible Officer of the Oil Company concerned that *the Tank is empty and the compartments are thoroughly gas free before the application of heat to any part of a derailed or damaged Rail Tank Car, such as the use of the Oxy Cutter, is permitted.* It must always be assumed in the absence of this Certificate that the Car contains vapour and is therefore very dangerous.

The same precautionary measures must be taken respecting the use of hammers on bolts, rivets, etc., or any other work which might create sparks.

The risk of explosion is always present.

214. The transport of a damaged Rail Tank Car must not be attempted. Should the Car be damaged and not obstructing the line or endangering traffic a watch should be maintained over the Car and arrangements made as soon as possible with the responsible Officer of the Oil Company concerned to have the Car emptied and the compartments made thoroughly gas free. As far as is reasonably possible a derailed or damaged Rail Tank Car should only be handled during daylight.

215. *Re-railing Operations.*

(a) A thorough examination of the Car concerned must be made at once to ascertain whether there is any escape of liquid or vapour, special attention being given to the examination of the Discharge Pipes, Leaks in the Tank itself and the Filling Domes. In this regard it must be distinctly understood that vapour will ignite at a considerable distance from the point of discharge.

(b) *A loaded or partially Loaded Car.*

(i) If on examination a leak is found or the Tank Car is damaged, action must be at once taken as set out in Instruction 213 and the responsible Officer of the Oil Company concerned informed, who will complete the emptying of the Tank, make it gas free and then furnish a certificate that the Tank is empty and the compartments are thoroughly gas free.

Re-railing operations must not be commenced until this certificate is obtained.

(ii) If on examination no leak is found and the Tank Car is not damaged to such an extent as to prevent its free running after replacement the Car may be re-railed by the use of jacks and packing.

If it is necessary in re-railing operations to use a Crane or to pull the Car in a derailed condition the Instructions contained in sub-clause (i) of clause (b) of the above must be carried out.

(c) An Empty Car.

- (i) If on examination the derailed Car is on its wheels and is not damaged to such an extent as to prevent its free running after replacement the Car may be re-railed.
- (ii) If on examination the derailed Car is on its side or is damaged so as to prevent its free running after replacement the responsible Officer of the Oil Company concerned must be informed, and he must furnish a certificate that he has examined the Tank and that the compartments are empty and thoroughly gas free.

Re-railling operations must not be commenced until this certificate is obtained.

216. In every case of handling a derailed or damaged Rail Tank Car special care must be taken to prevent slings and chains from slipping, as sparks may be produced.

Placing gear, chains, &c., on the platforms of a Rail Tank Car is strictly prohibited.

Striking rails with bars, or doing anything which might produce a spark is strictly prohibited.

217. In any case where there is a doubt regarding the safety of the action contemplated the senior Rolling Stock Officer at the scene must make a personal examination of the Car concerned, the damage sustained, the situation of the vehicle in relation to the track, and submit the essential particulars by telephone or by telegram to the Head Office so that a decision may be reached as to how the mishap will be handled.

ENGINEMEN.

218. The Instructions contained in this section refer to certain of the duties of Enginemen, but in addition to carrying out these Instructions every Engineman will be held responsible for the observance of any other Instruction in this Book with which he may be concerned.

219. Every Engineman and Cleaner must, where required to do so, sign on or be signed on before commencing and must sign off or be signed off after finishing duty, and any employe in these grades who fails to comply with this instruction, or who fails to report for duty and does not send a proper written excuse or report personally at least two hours before the time at which he is due to report for duty, will be regarded as being absent without leave.

220. Every Driver must immediately after signing on for duty peruse the running sheet and train running notices. He must obtain and, if necessary, sign for any time tables, amendments thereto, or special instructions when notified to do so.

221. Every Driver, Chargeman, or Hostler preparing a locomotive for service may peruse the Repair Cards or Repair Book and ascertain if any defects which have been booked require his special attention. He must test both water gauge glasses, examine the firebox, grate, brick arch, and baffle plate, start the air compressor slowly, fill the lubricators and see they are working; test all air and hand brake equipment; test the air compressor for heavy duty; test the sand gear, electric light equipment and ash pan slides, and check the enginemen's kits; thoroughly examine the engine and tender and all fire prevention appliances, drain the main reservoirs and book any defects. Where a booster or stoker is fitted it must also be tested. Lubricate all working parts not allotted to the Fireman in this Instruction. Wind the speed recorder clock, examine speed and time pencils, and mark the speed chart.

The Fireman assisting in the preparation of a locomotive must immediately after signing on for duty obtain the stores and take them to the locomotive, observe the steam pressure, test both gauge glasses, examine the fire, firebox, brick arch, and baffle plate; test both injectors, damper and release cock gear, check the fire irons, see that the tank is full and the coal properly trimmed; see that the sand boxes contain sufficient sand, clean the spark arresters, clean and oil the joint of the smokebox door, oil auxiliary cups above the footplate, and clean and oil the screw couplings; oil the valve gear, spring gear, brake rigging, engine and tender horn cheeks and hand brakes; spread and build the fire; clean and trim any oil lamps, clean the cab interior and cab windows. Report any defect to the Driver, and give him any assistance he may require.

The Driver, Chargeman, or Hostler who prepares the locomotive for service will be held responsible for it being in a thoroughly roadworthy condition prior to it leaving the shed. The locomotive must be at the T.R. point at the appointed time.

222. Every Driver must, immediately after taking charge of a locomotive, at intervals while it is in service, and when stabling it, test each water gauge glass separately in the following manner:—

- (a) Close the steam valve on top of the boiler.
- (b) Turn the water valve handle clockwise about half a turn. This permits water to flow from the boiler direct to the drain pipe and assists in keeping the water passage clear.
- (c) Turn the water valve handle clockwise as far as possible.
- (d) Open the steam valve on top of the boiler and allow steam to blow through the glass to the drain pipe and so assist in keeping the glass clean.

- (e) Turn the water valve handle counter clockwise as far as possible when the water should rise smartly in the glass. If it rises slowly this indicates a partial blockage of the water passage; if it rises high in the glass and then settles back slowly the steam passage is partially choked.
- (f) See that the water level in each glass is about the same.
- (g) On H, S and X class boilers the drain valve of the water column must also be opened for about five seconds in order to prevent any accumulation of sediment.

223. Every Driver must run cautiously up to a turntable, and must stop the engine before running on to it. Where an employe is not in charge of the turntable he must see that the turntable is level or down at the end towards which the engine is approaching, that the pawls are in position, and the Fireman must be sent forward to ascertain that the table is right for use.

224. When an engine is placed on a turntable ready for turning, the Driver must put the reversing lever in mid-gear, open the release cocks, and see that the hand brake is securely applied.

Whilst turning a turntable care must be taken to see that the speed is not excessive; the pawls must not be used to stop the movement of the table, but the speed must be so regulated that the table will be practically at rest before the pawls are placed in position.

225. Every Driver, when coming back on to any Passenger or Mixed train must see that his Fireman is on the footplate, and must not permit his Fireman to leave his engine until it is at rest against the train. Except where instructions are issued to the contrary, the Fireman must promptly couple the engine to the train, screw up the coupling, or see that the automatic couplers have engaged properly, connect the hose couplings, and open both train pipe cocks.

226. Except in the performance of absolutely necessary duties, no one must be allowed to ride on the side footplating of an engine, whether it be in steam or not, whilst it is being taken into or out of an engine shed or workshop, or, when in locomotive yards, approaching or passing coal stages or other obstructions that are in close proximity to the running line, but in any case, where it is necessary, the Driver must warn all concerned, and before moving his engine must satisfy himself that they are in a safe position to clear all obstructions.

227. Every Driver must see that his locomotive is provided with the proper head and tail signals, and that each lamp and tail disc on the locomotive is kept clean and in good order and that, except in foggy weather, a lamp is not burning during daylight.

228. Every Engineman must see that all oil utensils are kept clean, are not damaged while they are in his custody, and are returned to the Store in good order and condition.

229. An Engineman is not permitted to store oils or kerosene in his locker. When obtaining the stores for a trip the Fireman must also obtain a sealed bottle containing spare cylinder oil, which must be returned with other oil utensils at the completion of a trip. If any spare cylinder oil be used the Driver must record the particulars on a Repair Card or in the Repair Book.

230. Every Driver taking charge of a train leaving a terminal station or other starting point of a train where there is no Train Examiner on duty, must examine and test the brakes of such train in accordance with the Instructions for the Guidance of Train Examiners, and promptly report any defects found to his Officer-in-Charge, and deal with any damaged gear as instructed.

231. Every Engineman in charge of an engine under steam must see that the right and left hand injectors are used alternately and as far as practicable regulate the working of the injectors to give a continuous feed of water to the boiler while the engine is steaming and maintain about half a glass of water when running on a level track.

232. The level of the water in any boiler must not under any circumstances be allowed to fall below the bottom of the gauge glass nor must the level of the water be carried higher than three-quarters of a glass on locomotive boilers except as prescribed hereunder:—

- (a) On H, N, S, and X classes when topping a rising grade of about 1 in 50 which is followed by a similar down grade the water must be about seven-eighths of a glass.
- (b) On the N class a full glass of water must be carried when topping a rising grade of 1 in 40 which is followed by a similar down grade.

233. Every engineman must abstain from working an injector when passing across any viaduct or bridge over a public road, and must also, before opening or shutting an injector, see that no person is near the overflow pipe, and liable to get scalded by hot water or steam.

234. A Driver must be specially careful to prevent his engine priming. In every case where an engine has been standing the release cocks must be opened for a sufficient time before starting, to allow the cylinders to drain, and they should not be closed until the wheels have made a few revolutions or until such time as the Driver is satisfied that the cylinders are clear of water. If priming is due to a dirty boiler, the fact must be recorded on a Repair Card or in the Repair Report Book before leaving duty, otherwise it will be treated as being due to unskilful driving.

235. A Driver must not permit his engine to blow off unnecessarily, particularly when standing at a platform.

236. Every Driver must avoid firing up when passing through or standing in a tunnel, goods or produce shed, or other unsuitable place, and must have the fire as bright as possible before entering any such place.

237. Every Driver when taking water must see that the tank is not allowed to overflow, that the tank lid is placed in position and the spout of the crane is clear of the line and properly secured after use.

238. Every Engineman must keep a specially sharp look-out when approaching any level crossing or cattle pit.

239. Every Driver when his engine becomes either partially or wholly disabled, must notify his Officer-in-Charge by telephone or telegraph of the nature of the accident, and whether assistance is required, and if possible he must take steps to work his engine and train either to the end of the journey or to the nearest station. Any employe travelling as a passenger must, in such circumstances, render all necessary assistance to the train crew.

240. Every Driver, after an engine has been derailed or damaged, must gauge the wheels and make a careful examination of all working parts, especially the axles and springs, and endeavour to ascertain the cause of the mishap. Before continuing the journey he must move the engine carefully a few revolutions and satisfy himself that it is in a safe condition to run. At the completion of the trip he must furnish a full report of the occurrence.

241. Every Driver whose train is delayed must, whenever asked, give full information to Train Despatchers and Station Staffs.

242. Every Driver of an engine to which an accident has occurred, which may possibly have injured the permanent way, must at once notify the nearest permanent way employe so that the road may be examined before another train passes over it.

243. Except where instructions are issued to the contrary, when a train arrives at a terminal station, and the same engine is not required to take the same train out or to shunt the train, the Driver will be personally responsible for seeing that his engine is uncoupled from the train, before any other work such as overhauling the engine or taking water, etc., is entered upon, and the engine when uncoupled must, if practicable, be moved a short distance away from the train in order that Station-masters, Guards, and other employes may know that the engine has been detached.

When two or more engines require to be coupled up to run as light engines, the Fireman of the engine that comes on to the stationary engine or engines must do the coupling up of his engine, and when it is necessary to uncouple, this must be done by the Fireman of the Engine leading in the direction they are to move, and where there are more than two engines the uncoupling must be done in the same order.

244. Every Engineman should as far as possible avoid putting on a fresh fire immediately before or when drifting and immediately after closing the regulator open it slightly to permit sufficient steam to pass to the cylinders to prevent a partial vacuum being formed. The regulator must be kept in this position during the time the locomotive is drifting.

245. Every Fireman must at once inform his Driver of any signs of heating, knocking, or other defect on the locomotive, or anything unusual which he observes in the running of his own or any other train.

246. An Engineman must not fasten or weight the safety valve to obtain higher steam pressure. The correct setting of safety valves is five (5) pounds over the boiler working pressure (see Instruction 109), and whenever the pressure gauge shows that the safety valve is blowing off at two pounds or more over or under the proper blow-off pressure, the fact must be promptly reported on a Repair Card or in the Repair Book.

247. A Cleaner must not be permitted to interfere with the regulator or move an engine under steam, unless specially authorized and certified as competent to do so by a District Rolling Stock Superintendent or an Officer-in-Charge of a Depot, and such permission must only be granted within certain fixed limits, and where it is absolutely essential to enable a Cleaner to perform necessary duties. In every such case the facts must be reported to the Chief Mechanical Engineer.

ROLLING STOCK BRANCH—BOOK OF INSTRUCTIONS—Instruction 248 is to be deleted and the following amended instruction inserted in its stead (Page 123).

248. Every engineman in charge of a locomotive fitted with an ashpan flushing arrangement must see that the ashpan is flushed at the following times:—

- (a) Before the departure of a train.
- (b) After every 30 miles of passenger train running.
- (c) After every 15 miles of goods train running.
- (d) When grates are being shaken.
- (e) When the fire is being cleaned.

groove, or seating before closing the door. Clean the fire and ashpan.

The air compressor must not be working while the smokebox and fire are being cleaned.

When the fire has been cleaned the Driver, Charge-man, or Hostler must examine the firebox, grate, brick arch, and baffle plate. The blower valve, drop grate, ashpan slides, damper, and firebox door must be closed and the ash arrester, where fitted, placed in the running position.

The engine crew stabling a locomotive must take coal of the required class and quantity and properly trim the coal on the bunker, fill the water tank and place the correct amount of lighting-up wood in the cab of the engine. The Driver, Chargeman or Hostler must sign a docket showing the quantity and class of coal and the amount of firewood placed on the locomotive.

Before leaving the cab when the locomotive is stabled the Driver, Chargeman, or Hostler must place the reversing mechanism in mid-gear, see that the hand brake is applied, and that the release cocks are open; close all valves on the sight feed lubricator and the steam valves to the air compressor, turbo-generator and the circulating system and where fitted the steam valves of the booster or stoker; book any defects observed during the examination or whilst the locomotive was in his charge. The Fireman must return all oil containers to the Store.

251. Every Driver must, before leaving duty, report on R.S. 12A Form to the Officer-in-Charge every case of late running of his train, giving full details of any delay due to Rolling Stock causes, and also any accident or casualty involving injury to any passenger or employe, defect on or damage to rolling stock, bad loading or stowing of goods, derailment, bush fire, flood, washaway, defect in the road, or any unusual occurrence. He must also inform the Train Examiner of any defect on a vehicle.

252. Every Driver must correctly record on the Running Sheet the time of his Fireman, and must fill in correctly the work performed, the actual running time on each journey, and all the other particulars required thereon. He must deposit his Running Sheet in the prescribed place before leaving duty, with the reservation that if he has been relieved or has been on duty for more than 12 hours, he must deposit it when signing on for his next turn of duty.

253. Every Driver, Chargeman, or Hostler when taking coal or firewood at any Depot or Out-station must take the proper quantity and class of coal required and trim the coal on the bunker. He must sign a docket showing the coal and firewood placed on the locomotive.

254. Every Engineman and Cleaner located at a Depot or Sub-Depot where a Running Sheet or Shed Roster is posted must carefully examine such Running Sheet or Roster to ascertain the time he is required to report for duty.

255. Every Engineman or Cleaner whose name does not appear on the Daily Running Sheet or Roster must, before leaving duty, and on each subsequent day that his name is so omitted, report himself to the Officer-in-Charge, and ascertain from him the cause, otherwise he will be treated as being absent without leave.

256. Every Engineman or Cleaner who is absent from duty through illness must report himself to the Officer-in-Charge on the day before he wishes to resume, not later than 1 p.m. on week days, or 11 a.m. on Saturdays. Any Engineman or Cleaner who is on annual leave must notify the Foreman either personally or in writing of his intention to resume duty, and must arrange for such intimation to reach the Foreman not later than the time prescribed above on the day prior to his being due to resume duty, otherwise his name will not be included on the Roster, and he will not be entitled to payment for any time lost thereby.

BREAKDOWN TRAINS.

257. The Location and Composition of Loco. Trains for dealing with Breakdowns are as shown hereunder:—

Location.	Composition of Loco. Trains.							
	Loco. Vans.			Trav. Cars and Vans.				
	OO	TT	H	Y	YH	YZ	Z	ZH
North Melbourne ..	1	..	..	..	1	..	2	..
Jolimont ..	1	..	..	..	2	..	1	..
Newport Shops ..	..	1	..	..	..	..	1	..
BALLARAT ..	1	..	..	1	..	..	..	1
Maryborough ..	..	1	..	..	..	..	1	..
Donald ..	..	..	1	..	..	..	..	..
Ouyen ..	..	..	1	..	..	..	..	..
Mildura ..	..	..	1	..	..	..	..	..
BENDIGO ..	1	..	..	..	2	..	..	..
Korong Vale ..	..	..	1	..	..	..	..	..
GEE LONG ..	1	..	..	1	1	..	..	..
Ararat ..	..	1	..	..	..	1	..	..
Dimboola ..	..	1	..	..	..	1	..	..
Hamilton ..	..	..	1	..	..	..	..	..
Colac ..	..	..	1	..	..	..	..	..
Warrnambool ..	..	..	1	..	..	..	..	..
SEYMOUR ..	1	..	..	1	..	1	..	..
Benalla ..	..	1	..	..	..	1	..	..
Echuca ..	..	..	1	..	..	..	..	..
Wodonga ..	..	..	1	..	..	..	..	..
TRARALGON	..	1	..	..	..	..	1	..
State Mine ..	..	..	1	..	..	..	..	..
Korumburra ..	..	..	1	..	..	..	..	..

- (a) In each Loco. Van facilities are provided for the carriage of Way and Works Branch Equipment.
- (b) In addition to the Loco. Trains listed in the foregoing, the following provision is made:—

A Race Service Van is located at Jolimont and provided with breakdown equipment and spare material for Electric Stock, and is utilized to stand by during Race and Show traffic as arranged.

At the Overhead Depot, Jolimont, a Motor Emergency Van, containing breakdown equipment, is located for emergency use in the electrified area.

At North Melbourne Loco. Depot, three vehicles—an “H” truck, “Z” van, and “K” truck—are provided for use as “Crane Tenders.” These vehicles are equipped with material to be used in conjunction with the cranes when necessary.

(c) Narrow Gauge Lines:—

Every Brake Van is equipped with emergency breakdown equipment in accordance with the list shown at the end of these instructions.

258. Manning of Loco. Trains must be as under:—

- (a) Experienced men (one man at least having a knowledge of First Aid) must be available at all Depots specified in Instruction 257.
- (b) With regard to the Metropolitan Depots the manning of Loco. Trains is laid down in the General Appendix, and to ensure a competent staff being available at all times for breakdown, a gang of 6 men, including a competent Fitter, experienced in lifting with jacks and in breakdown work, must be employed at North Melbourne between the hours of 5 p.m. and 7.30 a.m. on the first five days of the week and from 12 noon on Saturdays to 7.30 a.m. on Mondays; these men can be divided between the Truck Shops and the Running Shed.

The whole of the men for manning the Loco. Trains are to be selected by the Workshops Managers at North Melbourne and Jolimont Workshops and the Chief Foreman, North Melbourne Locomotive Depot.

A list of the names and addresses of such men must be posted in a suitable location at each place so that in the case of a serious breakdown a further gang can be readily obtained.

259. The breakdown equipment is under the control of the Officer-in-Charge at each Depot, and he will be held responsible for seeing that it is securely locked up and the keys are kept in his office, and that the whole of the equipment is maintained in accordance with the following:—

(a) A reliable employe must be selected and instructed to maintain the equipment in the van in accordance with the list and blue print posted therein. The distinctive colour for the Depot as set out in Instruction 260 and shown on the blue print in the van is to be strictly adhered to.

(b) The whole of the breakdown equipment of the Loco. Train must be examined once a week and after each occasion on which any of the equipment has been used. During such examination the jacks must be tested.

The breakdown equipment in Narrow Gauge Vans must be inspected and checked once a month by the Officer-in-Charge of the Depot to which these vans belong.

Any damage or deficiency must be reported to the Officer-in-Charge who must take the necessary steps to effect repairs and replacements.

(c) When not in use all hydraulic jacks must be kept in the "Testing Frames" with the leathers expanded.

(d) All ropes must be taken out and aired in the sun at least once in every two months to ensure against dry rot, etc., after which they must be replaced on the bench in the van in neat coils.

- (e) All oil skin coats, trousers and hats must be hung in the cupboards provided for this purpose.

260. In order that the equipment in each Loco. van may be distinctive for the respective Depots, a colour scheme is laid down, and all the equipment must be painted in a suitable manner, such as, on both ends of wood packing and on the barrel or sides of jacks, in accordance with the following list:—

“OO” VANS.

North Melbourne	..	Pale blue
Jolimont	..	Red
Ballarat	..	Pale green
Bendigo	..	Yellow
Geelong	..	Pink
Seymour	..	Black

“TT” VANS.

Newport Workshops		Light stone
Dimboola	..	Dark blue
Ararat	..	Grey
Benalla	..	Brown
Maryborough	..	Dark stone
Traralgon	..	Dark green

“H” VANS.

Mildura	..	Dark blue with white cross
Korong Vale	..	Yellow with black cross
Hamilton	..	Grey with black cross
Colac	..	Pink with black cross
Warrnambool	..	Pink with white cross
Wodonga	..	Brown with white cross
Donald	..	Dark stone with black cross
Ouyen	..	Dark stone with red cross
State Mine	..	Black with white cross
Korumburra	..	Brown with yellow cross
Echuca	..	Stone

261. The equipment of the Loco. Trains is as shown hereunder:—

(a) Equipment of "00" Vans.

Axes	6
Bag, tool, containing hammer, chisels, hook-eyes, &c.	1
Bags, water feed	2
Bars, twisting	2
Bar, claw, 4 ft. long	1
Bars, chisel, flat, 6 ft. long	2
Bars, chisel, flat, 3 ft. long	3
Bars, chisel, crosscut, 6 ft. long	2
Bars, chisel, crosscut, 3 ft. long	3
Bars, pinch	4
Bar, 1¼ in. octagon, 5 ft. long, foot at one end and tapered to ½ in. diameter at other end ..	1
Bars, tommy, 5 ft. long	2
Bars, tommy, 2 ft. 6 in. long	4
Bars, screw jack (spares)	2
Beams, lifting with shackles and links attached for electric stock (Metric equiv	

Amendments to Rolling Stock Book of Instructions.

Instructions 261, Clause a, is to be amended and the following items deleted.

Block, snatch, 7 in. rope	1*
Block and tackle, 6 in. rope	1
Block and tackle, 3¾ in. rope	1
Rope, 6 in. 250 ft. long (falls for tackle)	1
Rope, 4 in. 250 ft. long (falls for tackle)	1
Rope, 3 in. 250 ft. long (falls for tackle)	1
Rope, coil 7 in. 250 ft. long	1
Rope, coil 5 in. 250 ft. long	1
Rope, coil, 3 in. 200 ft. long	1

*—All location except North Melbourne.

(a) Equipment of "00" Vans—*continued.*

Carbide, in drums	2
Chisels, flat	6
Chisels, crosscut	6
Chain, drag, 1½ in. link (link both ends) 35 ft. long	1
Chain, drag, 1 in. link (link both ends), 15 ft. long	1
Chain, drag, 1 in. link (link both ends), 12 ft. long	1
Chain, drag, ¾ in. link (link both ends), 20 ft. long	1
Chain, drag, ½ in. link (link one end, hook on other end), 22 ft. long	1
Chains, double hook	6
Chain, 7 standard coupling links	1
Chains, 3 standard coupling links	3
Clamp, engine driving crank	1
Clips, axle	2
Clips, water fed bag	2
Clips, spring, engine	6
Clips, spring, cars and wagons	6
Clips, axle box, tender	4
Clips, motion bars, A2 engine	2
Clips, motion bars, D ₀ engine	2
Clips, ramp (sets)	2
Couplings, screw	2
Cutter, bolt, patent	1
Detonators (tin containing 12)	1
Disc	1
Drawers, packing (sets)	2
Drawbar, intermediate, A2 engine	1
Drawbar, intermediate, Y engine	1
Drawbar and Drawhook combined	1
Drawhook, engine	1
Drawhook, tender	1
Drawhook for electric stock (Metro. equip- ment only)	1
Drifts, cotter, various sizes	3
Drum, with tap attached for kerosene	1

(a) Equipment of "00" Vans—*continued.*

Extractor, king pin	1
Feeder, oil, large	1
File, flat, 14 in.	1
File, fishback, 14 in.	1
File, round, $\frac{5}{8}$ in.	1
Flags, red and green (sets)	3
Funnels with pannikans for filling hydraulic jacks	4
Gauge, road level (straight edge and spirit level)	1
Gauge, road width	1
Gauge, wheel, telescopic	1
Hammers, copper	2
Hammers, hand	4
Hammers, flogging, large	3
Hammers, flogging, small	3
Handles, hydraulic packs (spares)	2
Hookeye, 2 ft. 6 in. long	1
Hookeyes, short	2
Hoses, W.H.B. intermediate, engine	3
Hoses, W.H.B. standard	3
Jacks, hydraulic, traversing (complete) 30 ton	2
Jacks, hydraulic, traversing (complete) 20 ton	4
Jacks, hydraulic, ship (complete) 30 ton	2
Jacks, German, 10 ton	2
Jacks, German, 6 ton	3
Jacks, German, 4 ton, 2 ft. 6 in. long	2
Jacks, screw, traversing, large, complete	4
Jacks, screw, traversing, small, complete	2
Jacks, screw, traversing, 15 ton, short, telescopic, for electric stock (complete) (Metro. equipment only)	2
Jack, bottle, large	1
Jack, bottle, small	1
Jacks, Trewhella, ratchet (complete)	2
Kerosene (case)	1

(a) Equipment of "00" Vans—*continued.*

Ladders, step van	..	..	..	6
Ladder, telescopic	..	..	..	1
Lamps, acetylene	..	..	..	2
Lamps, engine, head and tail	..	..	..	2
Lamps, flare	..	..	..	2
Lamps, hand	..	..	..	4
Lamps, side	..	..	..	2
Lamps, slush	..	..	..	12
Lamps, track walkers	..	..	..	2
Lamps, McGrath, for lighting van	..	..	..	2
Leathers, in oil, spares for hydraulic jacks, each class	..	..	..	9
Marlinspikes	..	..	..	2
Nuts, blank, for train pipe	..	..	..	4
Oil, cylinder	..	..	..	6 pts
Oil, bearing	..	..	..	4 gals.
Oxy Acetylene Equipment	..	..	..	1 set
Pads, axle box, in oil, 5 in. x 1½ in.	..	..	..	6
Pads, axle box, in oil, 7 in. x 1 in.	..	..	..	6
Packing, iron, assorted	..	..	..	1 cwt.
Picks, with shafts	..	..	..	2
Pins, king, 3 in. diameter	..	..	..	2
Pins, split, assorted	..	..	..	Qty.
Punches, pin, assorted	..	..	..	6
Punches, rod, ½ in. to 1 in.	..	..	..	6
Ratchets, traversing (spares)	..	..	..	2
Rails, double head, 22 ft. long	..	..	..	2
Rails, double head, 12 ft. long	..	..	..	2
Ramps, for 85 lb. rails (sets)	..	..	..	2
Ramps, for 70 lb. rails (set)	..	..	..	1
Rope, 6 in., 250 ft. long (falls for tackle)	..	..	..	1
Rope, 4 in., 250 ft. long (falls for tackle)	..	..	..	1
Rope, 3 in., 250 ft. long (falls for tackle)	..	..	..	1
Rope, drag, 7 in., 60 ft. long, thimble each end	..	..	..	1
Rope, coil, 7 in., 250 ft. long	..	..	..	1
Rope, coil, 5 in., 250 ft. long	..	..	..	1

(a) Equipment of "00" Vans—*continued.*

Rope, coil, 4 in., 250 ft. long	.. ..	1
Rope, coil, 3 in., 200 ft. long	.. ..	1
Rope, lashings, 42 ft. long	.. ..	9
Rope, 6 in., slings, 10 ft. overall	.. ..	2
Rope, 5 in., slings, 10 ft. overall	.. ..	2
Rope, 4 in., slings, 10 ft. overall	.. ..	2
Rope, 2 in., slings, 10 ft. overall	.. ..	2
Rope, 6 in., wire, drag, 25 ft. long, thimble each end	.. ..	2
Rope, 3 in., wire, drag, 25 ft. long, thimble each end	.. ..	1
Rope, 4½ in., wire, 10 ft. long, spliced each end	.. ..	1
Rollers, 2 in. diameter, 2 ft. long	.. ..	2
Saw, crosscut	.. ..	1
Saws, hand	.. ..	3
Saw, hack, with 1 dozen blades	.. ..	1
Sets, cold, with handles	.. ..	4
Sets, side, with handles	.. ..	4
Scotches, wheel	.. ..	24
Shackles, with pins, large	.. ..	6
Shackles, with pins, small	.. ..	4
Shovels	.. ..	6
Spanners, assorted, ¾ in. to 1½ in.	.. ..	1 set
Spanners, shifting, large	.. ..	2
Spanner, shifting, small	.. ..	1
Spanners, box, for repairing jacks	.. ..	2
Spanners, assorted, box, ⅝ in. to 1¼ in.	.. ..	1 set
Spanner, double ended, for big and little ends, A2 engines	.. ..	1
Spanner, double ended, for big and little ends, D engines	.. ..	1
Spanner, prior drawhook nut	.. ..	1
Springs, drawhook, engine	.. ..	2
Spares, for hydraulic jacks (valves, springs, &c.)	.. ..	Assort- ment
Stands, for testing hydraulic jacks	.. ..	6

(a) Equipment of "00" Vans—*continued.*

Tallow (in tin)	..	..	..	12 lb.
Timber packing—				
Softwood, 9 in. x 9 in. x 6 ft.	..	..	..	8
9 in. x 9 in. x 3 ft.	..	..	..	12
9 in. x 6 in. x 6 ft.	..	..	..	8
9 in. x 6 in. x 3 ft.	..	..	..	12
9 in., x 3 in. x 6 ft.	..	..	..	6
12 in. x 2 in. x 4 ft.	..	..	..	6
14 in. x 4 in. x 4 ft.	..	..	..	6
6 in. x 3 in. x 2 ft.	..	..	..	12
6 in. x 2 in. x 2 ft.	..	..	..	12
Hardwood, 9 in. x 3 in. x 6 ft.	..	..	..	4
9 in. x 6 in. x 3 ft.	..	..	..	4
6 in. x 4 in. x 1 ft. 6 in.	..	..	..	12
6 in. x 1 in. x 2 ft.	..	..	..	12
Toggles, wood	..	..	..	6
Tomahawks	..	..	..	4
Tongs	..	..	..	2
Torches	..	..	..	12
Trolley (as per design)	..	..	..	1
Tube, for spanners, 3 ft. long	..	..	..	1
Various thicknesses and lengths	..	..	..	6 cwt.
Vyce, with bench, fixed	..	..	..	1
Waste, cotton	..	..	..	8 lb.
Wedges, step	..	..	..	12
Wedges, hardwood	..	..	..	24
Wedges, steel, for compressing intermedia ^t drawbar springs (sets)	..	..	..	2
Wheel, emery	..	..	..	1
Wicks, lamp, $\frac{5}{8}$ in. x $\frac{3}{4}$ in.	..	..	..	12
Wick, lamp, balls	..	..	..	6

(b) Equipment of "TT" Vans.

Axes	2
Bag, tool, containing hammer, chisels, hook-eyes, etc.	1
Bags, water feed	2
Bar, twisting	1
Bar, claw, 4 ft. long	1
Bar, chisel, flat, 6 ft. long	1
Bars, chisel, flat, 3 ft. long	2
Bar, chisel, crosscut, 6 ft. long	1
Bars, chisel, crosscut, 3 ft. long	2
Bars, pinch	3
Bar, 1 $\frac{1}{4}$ in., octagon, 5 ft. long, foot at one end and tapered to $\frac{1}{2}$ in. diameter at other end ..	1
Bar, tommy, 5 ft. long	1
Bars, tommy, 2 ft. 6 in. long	2
Bars, screw jack (spares)	2
Block, snatch, 7 in. rope	1
Block, snatch, 4 in. rope	1
Block and tackle, 6 in. rope	1
Block and tackle, 3 $\frac{1}{2}$ in. rope	1
Block and tackle, 1 $\frac{1}{2}$ in. rope	1
Bolts with plates, large, for spragging engine wheels	3
Bolts with plates, small, for spragging tender wheels	3
Bolts and washers, assorted	Qty.
Bottle, oil (8 pints)	1
Boxes, axle, dummy, for trucks	4
Boxes, dummy, for truck frame	2
Brush, hand	1
Buckets	2
Carbide in tin	1
Chisels, flat	4
Chisels, crosscut	4
Chain, drag, 1 $\frac{1}{8}$ in. link (link both ends) 30 ft. long	1
Chain, drag, $\frac{5}{8}$ in. link (link one end, hook other end), 22 ft. long	1

(b) Equipment of "TT" Vans—continued.

Chain, drag, $\frac{1}{2}$ in. link (link one end, hook other end), 22 ft. long	1
Chains, double hook	6
Chain, 7 standard coupling links	1
Chains, 3 standard coupling links	3
Clamp, engine driving crank	1
Clip, axle	1
Clips, water feed bag	2
Clips, spring, engine	4
Clips, spring, car and wagon	4
Clips, axle box, tender	4
Clip, motion bars, A2 engine	1
Clip, motion bars, D ₂ engine	1
Clips, ramp (sets)	2
Couplings, screw	2
Cutter, bolt, patent	1
Detonators (tin containing 12)	1
Disc	1
Drawers, packing (set)	1
Drawbar, intermediate, A2 engine	1
Drawbar, intermediate, Y engine	1
Drawbar and drawhook combined	1
Drawhook, engine	1
Drawhook, tender	1
Drifts, cotter, various sizes	3
Drum, with tap attached for kerosene	1
Extractor, king pin	1
Feeder, oil, large	1
File, flat, 14 in.	1
File, fishback, 14 in.	1
File, round, $\frac{5}{8}$ in.	1
Flags, red and green (sets)	3
Funnels, with pannikans for filling hydraulic jacks	2
Gauge, road level (straight edge and spirit level)	1
Gauge, road width	1
Gauge, wheel, telescopic	1

(b) Equipment of "TT" Vans—*continued*.

Hammers, copper	2
Hammers, hand	2
Hammers, flogging	3
Handles, hydraulic jack (spares)	2
Hookeye, 2 ft. 6 in. long	1
Hookeyes, short	2
Hoses, W.H.B. intermediate, engine	2
Hoses, W.H.B. standard, engine	2
Jacks, hydraulic, traversing (30 ton complete)	2
Jacks, hydraulic, traversing (20 ton complete)	2
Jacks, hydraulic, ship (30 ton complete) ..	2
Jacks, German, 10 ton	2
Jack, German, 6 ton	1
Jacks, German, 4 ton, 2 ft. 6 in. long ..	2
Jacks, screw, traversing, large, complete ..	2
Jacks, screw, traversing, small, complete ..	2
Jack, bottle, large	1
Jack, bottle, small	1
Jacks, Trewhella, ratchet, complete ..	2
Kerosene (case)	1
Ladders, step, van	4
Ladder, telescopic	1
Lamp, acetylene	1
Lamps, engine, head and tail	2
Lamps, flare	2
Lamps, hand	2
Lamps, side	2
Lamps, slush	6
Lamps, track walker	2
Lamps, McGrath, for lighting van	2
Leathers in oil, spares for hydraulic jacks ..	8
Marlinspike	1
Nuts, blank, for train pipe	2
Oil, cylinder	6 pints
Oil, bearing	4 gals.
Oxy Acetylene Equipment	1 set
Pads, axle box, in oil, 7 in. x 1 in. ..	6

(b) Equipment of "TT" Vans—*continued.*

Pads, axle box, in oil, 5 in. x 1½ in.	..	6
Packing, iron, assorted	.. ..	1 cwt.
Picks, with shafts	.. ..	2
Pins, king, 3 in. diameter	.. ..	2
Pins, split, assorted	.. ..	Qty.
Plates, iron, 12 in. x 1 in. x 36 in.	.. ..	6
Punches, pin, assorted	.. ..	6
Punches, rod, ½ in. to 1 in.	.. ..	6
Rails (double headed) 12 ft. long	.. ..	4
Ratchets, traversing (spares)	.. ..	2
Ramps for 85 lb. rails (set)	.. ..	1
Ramps for 70 lb rails (set)	.. ..	1
Rope, 5 in., 250 ft. long	.. ..	1
Rope, 4 in., 250 ft. long	.. ..	1
Rope, 3 in., 250 ft. long	.. ..	1
Rope, 1½ in., 150 ft. long	.. ..	1
Rope, 6 in., 200 ft. long (falls for tackle)	.. ..	1
Rope, 3½ in., 200 ft. long (falls for tackle)	.. ..	1
Rope, drag, 7 in., 60 ft. long, thimble each end	.. ..	1
Rope, lashings, 42 ft. long	.. ..	6
Rope, 6 in., slings, 10 ft. overall	.. ..	2
Rope, 4 in., slings, 10 ft. overall	.. ..	2
Rope, 3 in., slings, 10 ft. overall	.. ..	2
Rope, 2 in., slings, 10 ft. overall	.. ..	2
Rope, 6 in., wire, drag, 25 ft. long, thimble each end	.. ..	1
Rope, 3 in., wire, drag, 25 ft. long, thimble each end	.. ..	1
Rope, 4½ in., wire, 10 ft. long, spliced each end	.. ..	1
Rollers, 2 in. diameter, 2 ft. long	.. ..	2
Saw, crosscut	.. ..	1
Saws, hand	.. ..	3
Saw, hack, with 1 dozen blades	.. ..	1
Sets, side, with handles	.. ..	2
Sets, cold, with handles	.. ..	2
Scotches, wheel	.. ..	12
Shackles, with pins, large	.. ..	4
Shackles, with pins, small	.. ..	2

(b) Equipment of "TT" Vans—continued.

Shovels	2
Spanners, assorted, $\frac{3}{8}$ in. to $1\frac{1}{2}$ in. ..	1 set
Spanner, shifting, large	1
Spanner, shifting, small	1
Spanners, box, for repairing jacks ..	2
Spanners, box, assorted, $\frac{5}{8}$ in. to $1\frac{1}{4}$ in. ..	1 set
Spanner, double ended, for big and little ends, A2 engine	1
Spanner, double ended, for big and little ends, D engine	1
Spanner for drawhook nut	1
Springs, drawhook, engine	2
Spares for hydraulic jacks (valves, springs, &c.)	Assort- ment
Stands for testing hydraulic jacks ..	4
Tallow, in tins	12 lb.
Timber, packing—	
Softwood, 9 in. x 9 in. x 6 ft. ..	6
9 in. x 9 in. x 3 ft. ..	8
9 in. x 6 in. x 6 ft. ..	6
9 in. x 6 in. x 3 ft. ..	6
9 in. x 3 in. x 6 ft. ..	6
18 in. x 2 in. x 4 ft. ..	6
14 in. x 4 in. x 4 ft. ..	6
6 in. x 3 in. x 2 ft. ..	12
6 in. x 2 in. x 2 ft. ..	12
Hardwood, 9 in. x 3 in. x 6 ft. ..	6
6 in. x 1 in. x 2 ft. ..	12
5 in. x 3 in. x 1 ft. 6 in. ..	12
5 in. x 2 in. x 1 ft. 6 in. ..	12
Various thicknesses and lengths	5 cwt.
Toggles, wood	6
Tomahawks	4
Tongs	2
Torches	6
Tube, for spanners, 3 ft. long	1

(d) Equipment of "H" Vans—*continued.*

Bar, round, 5 ft. long, claw one end and tapered to $\frac{1}{2}$ in. diameter other end ..	1
Bar, tommy, 5 ft. long	1
Bars, tommy, 2 ft. 6 in. long	2
Bars, screw jacks (spares)	2
Bags, water feed	2
Block, snatch, 6 in., rope	1
Block, $3\frac{3}{4}$ in. rope	1
Block and tackle, 6 in., rope	1
Block and tackle, 2 in. rope	1
Bolts and washers, assorted	Qty.
Bottle, oil (8 pts.)	1
Brush, hand	1
Buckets	2
Carbide, in tin	1
Chisels, flat	4
Chisels, crosscut	4
Chain, drag, 1 in. link (link both ends), 25 ft. long	1
Chain, drag, $\frac{5}{8}$ in. link (hook one end and link other end), 20 ft. long	1
Chain, drag, $\frac{1}{2}$ in. link (hook one end and link other end), 20 ft. long	1
Chain, 7 standard coupling links	1
Chains, 3 standard coupling links	2
Chains, double hook	4
Clamp, engine driving crank	1
Clips, water feed bag	2
Clips, spring, engine	2
Clips, spring, car and wagon	2
Clip, motion bar, A2 engine	1
Clip, motion bar, D ₀ engine	1
Clips, ramp (sets)	2
Coupling, screw	1
Cutter, bolt, patent	1
Detonators (tin containing 12)	1
Disc	1
Drawers, packing (set)	1

(d) Equipment of "H" Vans—*continued.*

Drawbar, intermediate, A2 engine	1
Drawbar, intermediate, Y engine	1
Drawbar and drawhook combined	1
Drawhook, engine	1
Drawhook, tender	1
Drifts, cotter, various sizes	3
Drum, with tap attached for kerosene ..	1
Extractor, king pin	1
Feeder, oil, large	1
Flags, red and green (sets)	2
Funnels, with pannikans for filling hydraulic jacks	2
Gauge, road level (straight edge and spirit level)	1
Gauge, road width	1
Gauge, wheel, telescopic	1
Hammer, copper	1
Hammers, hand	2
Hammers, flogging	2
Handles, hydraulic jacks (spares)	2
Hookeye, 2 ft. 6 in. long	1
Hookeyes, short	2
Hoses, W.H.B., intermediate, engine ..	1
Hoses, W.H.B., standard	1
Jacks, hydraulic, traversing (complete), 30 ton	2
Jacks, hydraulic, ship (complete), 30 ton ..	2
Jacks, German, 10 ton	2
Jacks, German, 6 ton	2
Jacks, screw, traversing (complete)	2
Jack, bottle, large	1
Jack, bottle, small	1
Kerosene (case)	1
Ladders, step, van	3
Lamp, acetylene	1
Lamps, engine, head and tail	2
Lamp, hand	1
Lamps, side	2
Lamps, slush	6

(d) Equipment of "H" Vans—continued.

Lamp, McGrath, for lighting van	1
Leathers, in oil, spares for hydraulic jacks, each class	4
Marlinspike	1
Nut, blank, for train pipe	1
Oil, cylinder	3 pints
Oil, bearing	2 gals.
Overalls, oilskin coat, trousers and hats (suits)	6
Pads, axle box, in oil, 7 in. x 1 in.	3
Pads, axle box, in oil, 5 in. x 1½ in.	3
Packing, iron, short lengths, various thick- nesses	¾ cwt.
Pick, with shaft	1
Pin, king, 3 in. diameter	1
Pins, split, assorted	Qty.
Plates, iron, 12 in. x 1 in. x 3 ft.	6
Punches, pin, assorted	6
Punches, rod, ½ in. to 1 in.	3
Ratchets, traversing (spares)	2
Ramps, 80 lb. rail (set)	1
Ramps, 70 lb. rail (set)	1
Rope, 5 in., 250 ft. long	1
Rope, 3 in., 250 ft. long	1
Rope, 6 in., 250 ft. long (falls for tackle) ..	1
Rope, 2 in., 250 ft. long (falls for tackle) ..	1
Rope, lashings, 42 ft. long	6
Rope, 5 in., slings, 10 ft. overall	1
Rope, 4 in., slings, 10 ft. overall	1
Rope, 3 in., slings, 10 ft. overall	1
Rope, 2 in., slings, 10 ft. overall	1
Rope, 6 in., wire drag, 25 ft. long, thimble at each end	1
Rope, 3 in., wire, drag, 25 ft. long, thimble at each end	1
Rope, 4½ in., wire, 10 ft. long, spliced each end	1
Rollers, 2 in. diameter, 2 ft. long	2
Saw, crosscut	1
Saws, hand	2
Saw, hack, with 1 dozen blades	1

(d) Equipment of "H" Vans—continued.

Sets, cold, with handles	2
Set, side, with handles	1
Scotches, wheel	12
Shackles, with pin, large	4
Shackles, with pin, small	2
Shovels	2
Spanners, assorted, $\frac{3}{8}$ in. to $1\frac{1}{2}$ in. (set)	1
Spanner, shifting, large	1
Spanner, shifting, small	1
Spanners, box, for repairs to jacks	2
Spanner, double ended, for big and little ends, A2 engines	1
Spanner, double ended, for big and little ends, D engines	1
Spares, for hydraulic jacks (valves, springs, etc.)	Assort- ment
Stands, for testing hydraulic jacks	2
Tallow (in tin)	6 lb.
Timber, packing—	
Softwood, 9 in. x 9 in. x 6 ft.	6
9 in. x 9 in. x 4 ft.	6
9 in. x 6 in. x 6 ft.	6
9 in. x 6 in. x 3 ft.	6
9 in. x 3 in. x 6 ft.	6
14 in. x 3 in. x 4 ft.	6
14 in. x 2 in. x 4 ft.	6
Hardwood, 9 in. x 3 in. x 6 ft.	6
6 in. x 1 in. x 2 ft.	12
Tomahawks	2
Tongs	1
Torches	6
Tube, for spanners, 3 ft. long	1
Vyce, with bench, fixed	1
Wedges, hardwood	24
Wedges, steel, for compressing intermediate drawbar springs	2
Wheel, emery	1

(e) Ambulance Equipment, Etc.

Blankets	..	..	..	..	3
Chest (Ambulance)	..	..	..	..	1
Food supplies and utensils (in cupboard)	..	..	..	..	Qty.
Splints, long, bundle	..	..	..	..	1
Splints, short, bundles	..	..	..	..	2
Stretchers	..	..	..	..	6

(f) **Narrow Gauge Lines.**—Equipment to be carried in the Brake Van of each train:—

Ambulance box	..	..	..	..	1
Axes	..	..	..	..	2
Bag, tool, containing the following:—					
Chisels, crosscut	..	..	..	..	2
Chisels, flat	..	..	..	..	2
Files	..	..	..	..	2
Hammer, hand	..	..	..	..	1
Hookeye	..	..	..	..	1
Saw, hack, 3 blades	..	..	..	..	1
Bar, tommy, 4 ft. long	..	..	..	..	1
Chains, narrow gauge, drag	..	..	..	..	2
Gauge, road level	..	..	..	..	1
Gauge, road width	..	..	..	..	1
Gauge, wheel, telescopic	..	..	..	..	1
Jacks, lifting	..	..	..	..	2
Kerosene, container, 8 pints	..	..	..	..	1
Lamps, torch, short handle	..	..	..	..	6
Packing, iron	..	..	..	..	Small qty.
Punch, rod, $\frac{3}{8}$ in.	..	..	..	..	1
Rope, wire, drag, 3 in. (10 ft. long, spliced each end)	..	..	..	..	1
Saw, crosscut	..	..	..	..	2
Saw, hand	..	..	..	..	2
Scotches, wheel, hand	..	..	..	..	6
Tomahawks	..	..	..	..	2

60-TON AND 30-TON WRECKAGE CRANES.

262. (a) Every Officer-in-Charge and every employé concerned in the working of a 60-ton or 30-ton wreckage crane must observe the Rules and Regulations and instructions laid down for the working of a locomotive as they apply with equal force to the care, management and working of the cranes.

(b) Every Officer concerned must make himself thoroughly conversant with the movements, &c., of the crane, and must see that, when in use, the greatest care is exercised in anchoring and fixing the foundations for the beams when required, and that the load to be lifted is not excessive for the conditions under which the crane is being operated.

263. (a) The Chief Foreman or Foreman Mechanic or Sub-Foreman or Leading Hand Fitter deputed by the Chief Foreman must always accompany a wreckage crane to the scene of any accident, derailment, or other operation at which it is called into requisition and a crane driver or qualified engine driver must travel on each crane.

(b) Whenever one or more cranes are attached to a train a crane driver, or in the event of a crane driver not being available, an engine driver must ride on each crane.

(c) The Depot Foremen at Ararat and Bendigo loco. depots must make similar arrangements to those shown in Clauses (a) and (b) with respect to the 30-ton wreckage crane located at their depot.

264. The Officer-in-Charge before allowing the jib or any other part of the crane to foul any running line, must personally see that provision, in accordance with the Rules and Regulations, is made for the proper protection in both directions of the crane and of the running line or lines, and if within the electrified area, he must not allow operations to commence without first complying with the instructions in the General Appendix.

When the crane is in operation the Officer-in-Charge must see that all precautions are taken to ensure that the jib or any other part of the crane does not in any of its movements foul any obstacle, such as electrical overhead equipment, telegraph, telephone, or electric light wires, over-head bridges, or signal posts.

265. (a) A crane driver trained in the working and management of the crane must always be on duty at the North Melbourne loco. depot, and he must take charge of the crane in every instance in which it is required.

(b) At Ararat and Bendigo loco. depots the Depot Foreman concerned must make suitable arrangements so that a crane driver trained in the working of the crane may be readily obtained at short notice when required.

(c) In the event of the transfer to another depot of a trained crane driver, arrangements must be made by the Foreman concerned for the immediate selection and training of another man.

266. Steam must be raised at least once every fortnight, and each crane put through the various movements by each driver trained to handle it in turn, so that all may be thoroughly conversant with its working, and also to ensure that all parts will be in proper working order when required.

267. Before a fire is lit in the boiler of a crane on any occasion, the employé responsible, after testing the water gauge cocks in order to ascertain the quantity of water in the boiler, must run off through the blow-off cock about a quarter of a glass of water to remove any sediment that may have accumulated, but care must be taken to see that not less than a quarter of a glass of water remains in the boiler.

268. The full equipment of tools, appliances, lifting gear, &c., provided, must be kept on each crane or match or equipment truck, and must not be taken away

for any other purpose, and every driver taking over a crane from another driver must satisfy himself that all the gear is on hand and in good order. A Leading Hand Fitter must check the gear once every month, to see that it is intact.

269. Before any lifting gear is supplied for use on a crane, it must be approved by the Chief Mechanical Engineer. The Workshops Manager, Newport, must certify that it is of the proper strength, and in good order and condition.

All the working gear of the crane, when not in use, must be properly protected from the weather by the covers provided for that purpose.

270. (a) The boiler of each crane must be thoroughly examined in a similar manner to a stationary boiler.

(b) Every three (3) months the fire bars must be taken out and the foundation plate and the boiler tubes inside the firebox in the case of a 60-ton crane, and the galloway tubes in the case of a 30-ton crane, must be thoroughly examined.

271. Every fusible plug, safety valve, injector, steam pipe, pressure gauge, blow-off cock, and all other boiler mountings must be thoroughly examined and the lead in the fusible plugs renewed every six (6) months.

272. The boiler must be washed out whenever it is considered necessary, but not less than once in every two (2) months.

273. (a) The slewing coil friction clutches and gear of each 60-ton crane must be thoroughly examined in position every three (3) months.

NOTE.—See drawing No. 2996 for instructions regarding the adjustment of coil clutches.

(b) The double friction clutch and gear of each 30-ton crane must be thoroughly examined in position every three (3) months.

274. Every other part of the crane, including big and

AMENDMENT TO ROLLING STOCK BRANCH BOOK OF INSTRUCTION—60 Ton and 30 Ton Wreckage Cranes.

The following is to be inserted as an additional instruction on Page 150 of the abovementioned book:

274. (a) The air and hand brake equipment of the cranes must be thoroughly examined every twelve (12) months.

be handled.

(c) Any defect in the crane, lifting gear, &c., must be reported as soon as practicable to the Chief Mechanical Engineer.

276. The axle boxes of the crane and the match and equipment trucks must be examined every six (6) months, and if necessary re-oiled.

277. All examinations must be properly recorded in a book kept for that purpose.

278. Whilst engaged in any operation the driver having charge of the crane must take his instructions, for any movement required, from the Officer-in-Charge of the operations or his properly appointed deputy.

279. Before leaving the crane, or after finishing work at any time, the driver must see that everything is in proper order and ready for immediate service when required, and must be specially careful to see—

- (a) that the water tanks are filled;
- (b) that the coal bunkers are filled;
- (c) that the fire is properly cleaned out;

- (d) that the ash-pan is clean;
- (e) that the boiler is left with the gauge glass showing $\frac{3}{4}$ full of water;
- (f) that the fire is laid ready for lighting;
- (g) that all lubricating trimmings, &c., are withdrawn; and
- (h) that all covers are replaced over the working parts, and the curtains are down and properly secured.

280. Before leaving the shed or after finishing work, the driver must enter on a Repair card and report personally to the Depot Foreman any defects in or repairs necessary to the crane.

INSTRUCTIONS Nos. 281 to 296 APPLICABLE TO THE 60-TON WRECKAGE CRANES Nos. 18 & 19.

281. When the crane is not in use, the detachable balance weight must be placed on the underframe on the brackets fixed at the opposite end to the centreing gear and secured by the four bolts provided.

Before any load is lifted the centreing gear must be turned over clear and the detachable weight attached to the fixed balance weight by means of the four bolts provided.

To lift the detachable balance weight into position, slacken off nuts of the holding-down bolts and turn the bolts $\frac{1}{4}$ turn to allow the tee heads to lift out of holes in underframe. Then place fixed balance weight centrally over the detached weight, lift the weight by means of the screw jacks, taking care to see that the weight is lifted evenly. Insert the weight-securing bolts and, when the weight is fully up, screw on the nuts.

The screw jacks shall then be lowered so that the tops are right down on to the underframe, after which the crane shall be slewed to bring the securing bolt nuts to a place where they will be accessible, and they must be screwed up tightly.

282. (a) The crane is fitted with two injectors and an ejector, viz.:—A Gresham and Craven Injector and a Penberthy Auto-positive Injector on the boiler, and an Ejector on the L.H. bunker.

The Gresham and Craven injector is to be used under ordinary conditions.

The Penberthy Auto-positive injector is to be used when the feed water becomes heated by weather conditions or by the use of the ejector. It is also to be used at least once during each occasion the crane is working.

The Ejector is provided to supply water to the tanks when they require filling from a source below the level of the tanks.

(b) The operation of the injectors to feed water from the crane tank into the boiler is the same for both injectors. Before operating the injector, see that the delivery cock on the boiler is open. Open the water cock and then the injector steam valve. Regulate the water cock to prevent overflow. When the water cock is once regulated properly it may be left set in this position, and the steam valve only will need to be used to start and stop the injector unless the boiler pressure has altered to a great extent.

(c) To feed water into the crane tank from a source below the level of the tanks, connect the hose to the ejector side connexion and remove the filling hole cover so that the delivery into the tank is visible. Open the ejector steam valve until the water is discharged into the tank, then close down the seam valve to the minimum opening which will retain a good flow of water into the tank.

283. Before starting out from the shed on any journey, and on completing work at any place, the driver must satisfy himself that the crane and match and equipment trucks are in proper running condition, and must be careful to see—

- (a) that the detachable balance weight is securely bolted on the opposite end of the underframe to the centreing gear;
- (b) that the top of the trestle on the match truck is well greased, and that the jib is lowered and securely resting on the trestle on the match truck, the derricking ropes being left slightly slack; that the rear end of the superstructure is securely locked by the centreing gear, and the centreing gear locking pin is in position, and that the 60-ton and 16-ton lifting blocks are properly stowed on the match truck, and that the 16-ton block is locked in position with the bar provided, and all lifting ropes are left slightly slack;
- (c) that the end and centre beams are "IN" and securely locked with the pins provided, and the pendulum balance weights on the ratchet spindles are oiled and swing freely;
- (d) that the top part of the chimney of the boiler is in the lowered position;
- (e) that the two sliding pinions (if the crane is to be hauled) of the travelling gear on the underframe are drawn *out of gear*, and the hand wheels are padlocked to prevent any movement when the crane is in motion, that the four bogie frame relieving blocks are in the brackets on the sides of the underframe, and the four rail clips are in the support brackets;
- (f) that the axle boxes and all other working parts of the crane and match and equipment trucks are properly lubricated and are in good order.

- (g) that the crane and match and equipment are properly coupled together.
- (h) that the *Air Brake Cock* on the side of the underframe adjacent to the cab, for operation in an emergency by an employé travelling on the crane, is in working order, and that by its operation the brakes are properly applied.
- (i) that the water tanks are full, the coal bunkers are full of coal, and everything in proper order and ready for use.

284. Steam may be raised while the crane is in motion. The working pressure of the boiler is 130 lb. per sq. inch.

285. Before commencing to work the crane all lubricators must be properly attended to and all working parts properly lubricated. The engine cylinders must be drained and warmed with steam.

In all cases where provision has been made for grease compression cup lubrication, the grease cup cap must be screwed up to supply sufficient grease to the wearing surfaces concerned.

Where oil lubrication is required, oil must be supplied in sufficient quantity for the wearing surface concerned.

See Instruction 295 for details of lubrication.

286. When it is necessary to lift any load the following instructions must be observed:—

- (a) The crane must be placed in a position most suitable for dealing with the work.
- (b) Before any lifting work is commenced the sliding pinions of the travelling gear must be out of gear and properly secured in that position.
- (c) All the bogie frame relieving blocks must be inserted between the underframe side rubbing plates and the tops of the bogie frames.

- (d) The beams must, when necessary, be out to the positions required, and the ends securely packed as shown in Diagrams 62, 63, and 64 so as to form an extended base to increase the stability of the crane. The packing must be arranged so that the pressure on the ground is not excessive. About 54 square feet under the end of the centre beam and about 34 square feet under the ends of the four end beams will be required for average ground with the loads as shown in Instruction 293, Table No. 61.
- (e) The rail clips must be securely fastened to the rails.

287. (a) To Lift the Jib:—

- (a) The engine reversing lever must be in back gear;
- (b) The derricking clutch in gear; and
- (c) The derricking brake released.
- (b) **To Lower the Jib:—**
- (a) The engine reversing lever must be in fore gear;
- (b) The derricking clutch in gear; and
- (c) The derricking brake released.
- (c) **Derricking Gear Not in Use:—**
- (a) The derricking brake must be applied; and
- (b) The derricking clutch out of gear.

288. (a) To Lift Loads on the Main Block:—

- (a) The engine reversing lever must be in fore gear;
- (b) The lifting clutch 1st motion in gear;
- (c) The heavy lifting clutch in gear;
- (d) The main lifting barrel strap brake released; and
- (e) The foot brake lever released.

NOTE.—When the load is lifted it must be held by the foot brake.

- (b) **To Lower Loads on the Main Block by Control of Foot Brake.**
- (a) The foot brake must be applied;
 - (b) The lifting clutch 1st motion out of gear; and
 - (c) The load lowered carefully by control of foot brake.
- (c) **To Unwind the Main Block Rope:—**
- (a) The engine reversing lever must be in back gear;
 - (b) The lifting clutch 1st motion in gear;
 - (c) The heavy lifting clutch in gear;
 - (d) The main lifting barrel strap brake released; and
 - (e) The foot brake lever released.
- (d) **The Main Block Not in Use:—**
- (a) The Main lifting barrel strap brake must be applied;
 - (b) The heavy lifting clutch out of gear; and
 - (c) The lifting clutch 1st motion out of gear.

289. (a) **To Lift Loads on the Auxiliary Block:—**
- (a) The engine reversing lever must be in fore gear;
 - (b) The lifting clutch 1st motion in gear;
 - (c) The auxiliary lifting clutch in gear;
 - (d) The auxiliary lifting barrel brake released; and
 - (e) The foot brake lever released.
- (b) **To Lower Loads on the Auxiliary Block by Control of Foot Brake:—**
- (a) The foot brake must be applied;
 - (b) The lifting clutch 1st motion out of gear; and
 - (c) The load lowered carefully by control of foot brake.

(c) To Unwind the Auxiliary Block Rope:—

- (a) The engine reversing lever must be in back gear;
- (b) The lifting clutch 1st motion in gear;
- (c) The auxiliary lifting clutch in gear;
- (d) The auxiliary lifting barrel brake released; and
- (e) The foot brake lever released.

(d) The Auxiliary Block Not in Use:—

- (a) The auxiliary lifting barrel brake must be applied;
- (b) The auxiliary lifting clutch out of gear; and
- (c) The lifting clutch 1st motion out of gear.

(e) The Auxiliary Lifting Clutch and the Heavy Lifting Clutch must not be in gear at the same time.**290 (a) To Slew the Crane in the Right-hand Direction:—**

- (a) The engine reversing lever must be in fore gear;
- (b) The slewing friction cone brake released; and
- (c) The side hand wheel turned anti-clockwise until inner coil clutch is engaged.

(b) To Slew the Crane in the Left-hand Direction:—

- (a) The engine reversing lever must be in fore gear;

- (b) The slewing friction cone brake released; and
- (c) The side hand wheel turned clockwise until outer coil clutch is engaged.

NOTE.—All slewing movements must be made with the engine reversing lever in fore gear.

(c) **The Slewing Gear Not in Use:—**

- (a) The side hand wheel must be adjusted to bring the coil clutch sliding collar into the central position; and
- (b) The slewing friction cone brake applied.

Page 158.

Add the following as a new clause to Instruction 290.

(d) **Special Care of Slewing Gear.**

- (a) When using the slewing gear special care is to be taken to see that the engine crank shaft speed does not exceed 250 revolutions per minute.
- (b) When making a stop the jib shall be brought to rest slowly by the gradual shutting of the steam regulator valve.

fixed:—

- (a) The engine reversing lever must be placed in fore gear;
- (b) The travelling clutch in gear;
- (c) The two hand wheels on side of underframe unlocked;
- (d) The two hand wheels operated to place two bogie sliding pinions into gear. If necessary, move the engine crank to enable sliding pinions to be placed in gear; and
- (e) The two hand brakes released.

(b) To Travel the Crane in a Backward Direction:—

- (a) The engine reversing lever must be placed in back gear;
- (b) The travelling clutch in gear;
- (c) The two hand wheels on side of underframe unlocked;
- (d) The two hand wheels operated to place two bogie sliding pinions into gear. If necessary, move the engine crank to enable sliding pinions to be placed in gear; and
- (e) The two hand brakes released.

(c) The Travelling Gear Not in Use:—

- (c) The two hand wheels on side of underframe must be operated to place two bogie sliding pinions out of gear;
- (b) The two hand wheels padlocked;
- (c) The travelling clutch out of gear; and
- (d) The two hand brakes applied if crane is not to be moved.

293. (a) Before any load is lifted by the crane the detachable balance weight must be attached to the superstructure fixed balance weight under the boiler by means of four bolts and the centreing gear turned over clear. The main block and auxiliary block working loads of the crane in the various positions of the blocks with all beams "out" are shown on the crane indicator.

Table No. 61 shows the loads that may be lifted with beams "out" and with no beams out. When beams are fully out they must be securely packed, see Diagrams Nos. 62, 63, and 64 and all rail clips must be secured to the rails.

TABLE No. 61.

Radius of Block in Feet.	Maximum Load in Tons.					
	All Beams Fully Out. (See notes below.)		End Beams Only Fully Out.		No Beams Out.	
	Main Block.	Auxiliary Block.	Main Block.	Auxiliary Block.	Main Block.	Auxiliary Block.
17 ..	60	..	27	..	14	..
18 ..	55	..	25	..	13	..
19 ..	50	..	23	..	12	..
20 ..	46	..	21	..	11	..
21 ..	42	..	20	..	10	..
22 ..	38	..	19	..	9	..
23 ..	35	16	18	16	8	8
25 ..	30	16	16	15	8	8
26 ..	28	16	15	14	7	7
28 ..	24	16	13	13	6	6
30 ..	21	16	11	12	5	6
33 ..	..	16	..	11	..	5
35 ..	..	16	..	9	..	4½
37 ..	..	16	..	7	..	4

NOTE:—(a) When all beams are fully out the centre beam must be out on the side on which the load to be lifted is located. If required to slew to the other side, the load must be slewed to either end and then the centre beam drawn out on the opposite side and securely packed. The loads shown in columns "End beams only fully out" and "No beams out" may be slewed all round the crane.

(b) When the crane is in such a position that it is not possible or desirable to use the beams out to their fullest extent, as shown in Table No. 61, the loads that may be lifted at various positions of the beams are as shown in Tables 62 to 65.

(b) These tables show the main and auxiliary block loads that may be lifted at the different radii of the blocks when all the beams are out to various positions up to their full lengths, securely packed and rail clips, &c., secured.

TABLE NO. 62.—MAIN BLOCK WITH CENTRE AND END BEAMS.

Radius of Block in Feet.		Maximum Loads in Tons, for Various Positions of Beams.					All Beams in and Packed. (See Note (b).)
		Slewed only 180 degrees on side of Crane. (See Note (a).)					
		Centre Beam Fully Out 4 ft. 5 in. End Beams Fully Out 2 ft. 5½ in.	Centre Beam Out 3 ft. End Beams Fully Out 2 ft. 5½ in.	Centre Beam Out 2 ft. 5½ in. End Beams Fully Out 2 ft. 5½ in.	Centre Beam Out 2 ft. End Beams Out 2 ft.	Centre Beam Out 1 ft. End Beams Out 1 ft.	
17	..	60	44	39	35	27	22
18	..	55	40	35	32	25	20
19	..	50	36	32	29	23	19
20	..	46	33	29	27	21	18
21	..	42	30	27	25	20	16
22	..	38	28	25	23	19	15
23	..	35	26	24	22	18	14
25	..	30	23	21	19	15	12
26	..	28	21	19	18	14	11
28	..	24	19	17	16	12	9
30	..	21	17	15	14	11	8

NOTES:—(a) The centre beam must be out on the side on which the load to be lifted is located. If required to slew to other side, the load must be slewed to either end and then the centre beam drawn out on the opposite side and securely packed.

(b) All end beams are to be out flush with underframe, or further if possible, and packed. The centre beam is to be packed at each end. The load may then be slewed all round the crane. The packing must be placed under the beams, not under the beam housings.

TABLE NO. 63.—AUXILIARY BLOCK WITH CENTRE AND END BEAMS.

Radius of Block in Feet.	Maximum Loads in Tons, for Various Positions of Beams.					All Beams in and Packed. (See Note (b).)
	Slewed only 180 degrees on side of Crane. (See Note (a).)					
	Centre Beam Fully Out 4 ft. 5 in. End Beams Fully Out 2 ft. 5½ in.	Centre Beam Out 3 ft. End Beams Fully Out 2 ft. 5½ in.	Centre Beam Out 2 ft. 5½ in. End Beams Fully Out. 2 ft. 5½ in.	Centre Beam Out 2 ft. End Beams Out 2 ft.	Centre Beam Out 1 ft. End Beams Out 1 ft.	
23 ..	16	16	16	16	16	15
25 ..	16	16	16	16	16	14
26 ..	16	16	16	16	15	13
28 ..	16	16	16	16	14	11
30 ..	16	16	15	15	12	10
33 ..	16	15	14	13	10	8
35 ..	16	14	12	12	9	7
37 ..	16	12	10	10	8	6

NOTES:—(a) The centre beam must be out on the side on which the load to be lifted is located. If required to slew to other side, the load must be slewed to either end and then the centre beam drawn out on the opposite side and securely packed.

(b) All end beams are to be out flush with underframe, or further if possible, and packed. The centre beam is to be packed at each end. The load may then be slewed all round the crane. The packing must be placed under the beams, not under the beam housings.

TABLES NOS. 64 AND 65.

These tables show the main and auxiliary block loads that may be lifted at the various radii of the block when the end beams only are out to various positions up to their full length, securely packed and rail clips, &c., secured.

TABLE NO. 64.—MAIN BLOCK WITH ALL END BEAMS ONLY.

Radius of Block in Feet.			Maximum Loads, in Tons, for Various Positions of Beams.		
			Slewed completely round Crane.		
			End Beams Fully Out 2 ft. 5½ in.	End Beams Out 2 ft.	End Beams Out 1 ft.
17	..	..	27	26	25
18	..	..	25	25	24
19	..	..	23	23	22
20	..	..	21	21	20
21	..	..	20	20	18
22	..	..	19	18	17
23	..	..	18	17	16
25	..	..	16	15	14
26	..	..	15	14	13
28	..	..	13	12	11
30	..	..	11	10	9

TABLE NO. 65.—AUXILIARY BLOCK WITH ALL END BEAMS ONLY.

Radius of Block in Feet.			Maximum Loads, in Tons, for Various Positions of Beams.		
			Slewed completely round Crane.		
			End Beams Fully Out 2 ft. 5½ in.	End Beams Out 2 ft.	End Beams Out 1 ft.
23	..	..	16	15	14
25	..	..	15	14	13
26	..	..	14	13	12
28	..	..	13	12	11
30	..	..	12	11	10
33	..	..	11	10	9
35	..	..	9	8	7
37	..	..	7	6½	6

(c) All the loads in the above Tables Nos. 61 to 65 are based on the assumption that the load is lifted in a vertical direction. When the load is lifted in such a position that the ropes from the jib pulleys to the hook block will be pulled to an angle with the vertical the loads that may be lifted must be reduced as shown in Tables Nos. 66 and 67.

In using these tables the Officer-in-Charge of the crane and operations must use his discretion as to the loads to be allowed in each case as the ground will sustain a portion of the load until it is brought by the crane into a position immediately under the jib pulleys.

TABLES NOS. 66 AND 67.

These Tables are based on the columns headed "All beams fully out" in Tables Nos. 61, 62, and 63. Other loads shown in Tables Nos. 61, 62, 63, 64, and 65 must be reduced proportionately when the load is to be lifted at an angle with the vertical, and the beams are not fully out.

TABLE NO. 66.—MAIN BLOCK.

Radius of Block in Feet.		Maximum Loads in Tons.					
		Angle of Ropes to the Vertical.					
		15 Degrees.		30 Degrees.		45 Degrees.	
		All Beams Fully Out.	Beams In.	All Beams Fully Out.	Beams In.	All Beams Fully Out.	Beams In.
17	..	29	9	20	7	17	6
18	..	28	9	20	7	17	6
19	..	27	8	19	6	17	6
20	..	26	8	19	6	17	5
21	..	25	7	19	6	17	5
22	..	24	7	18	6	16	5
25	..	21	6	17	5	15	5
26	..	20	6	16	5	15	4
28	..	18	5	15	4	14	4
30	..	16	4	14	3	13	3

TABLE NO. 67.—AUXILIARY BLOCK.

Radius of Block in Feet.		Maximum Loads in Tons.					
		Angle of Ropes to the Vertical.					
		15 Degrees.		30 Degrees.		45 Degrees.	
		All Beams Fully Out.	Beams In.	All Beams Fully Out.	Beams In.	All Beams Fully Out.	Beams In.
23	..	16	7	16	5	15	5
25	..	16	6	16	5	15	4
26	..	16	6	16	5	14	4
28	..	16	6	15	4	14	4
30	..	16	5	14	4	13	4
33	..	15	4	13	3	13	3
35	..	14	4	12	3	12	3
37	..	13	3	12	3	12	3

294. Diagram No. 61 indicates the maximum loads that the main and auxiliary blocks of the crane may lift, with no beams out.

Diagram No. 62 indicates the maximum loads that the main and auxiliary blocks of the crane may lift at the various radii and method of packing under the beams of the crane on first class lines.

The beams must be fully out and properly packed under the ends. If for any reason the beams cannot be drawn out fully, they must be drawn out as far as possible and securely packed, and the load reduced as shown on Tables Nos. 62 and 64 main block and Nos. 63 and 65 auxiliary blocks (see Clause (b) of Instruction No. 293).

Diagram No. 63 indicates the method of packing under the beams of the crane on second class lines.

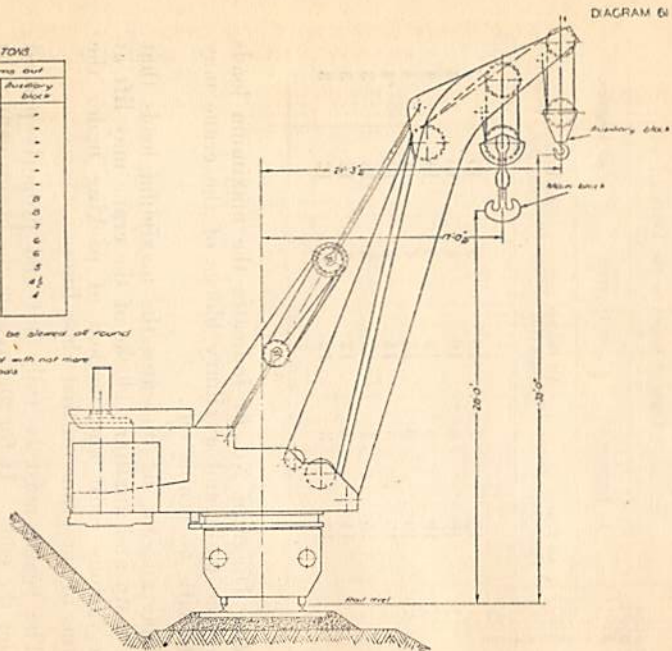
Diagram No. 64 indicates the method of packing under the beams on level tracks.

Diagram No. 65 indicates lifting gear arrangements.

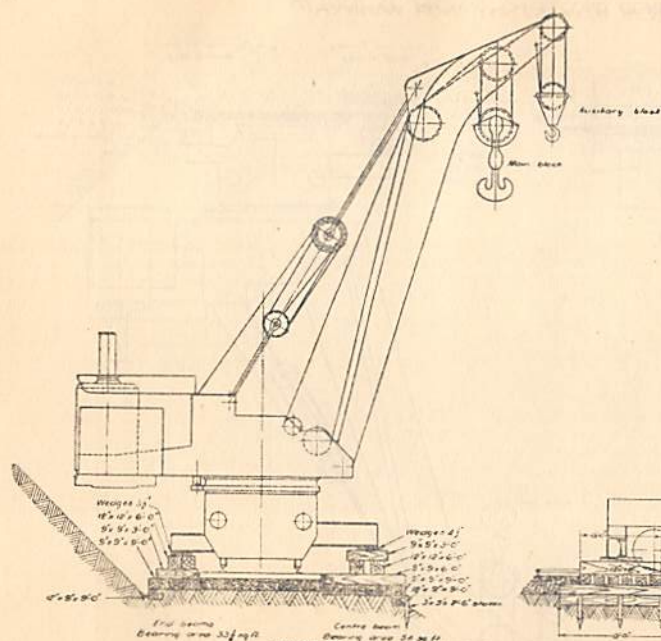
MAXIMUM LOAD IN TONS

Radius of block in feet	No beams out	
	Main block	Auxiliary block
17	16	-
19	13	-
20	12	-
20	11	-
21	10	-
22	9	-
22	8	0
22	0	0
24	7	7
25	6	6
30	5	6
33	-	5
35	-	4½
37	-	4

Note: The loads shown may be slowed at round
the crane.
The crane may be self projected with not more
than one half of the above loads.



MAXIMUM LOAD TABLES WITH BEAMS IN MAIN BLOCK
& AUXILIARY BLOCK



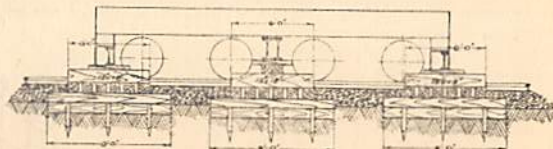
MAXIMUM LOAD IN TONS

Radius of block in feet	All beams fully out (see note below)		End beams only fully out	
	Main block	Auxiliary block	Main block	Auxiliary block
17	60	-	27	-
18	55	-	25	-
19	50	-	23	-
20	45	-	21	-
21	42	-	20	-
22	38	-	18	-
23	35	-	16	-
24	30	16	14	16
26	28	-	13	15
28	24	-	12	13
30	21	-	9	12
31	-	-	-	8
32	-	-	-	8
33	-	-	-	7

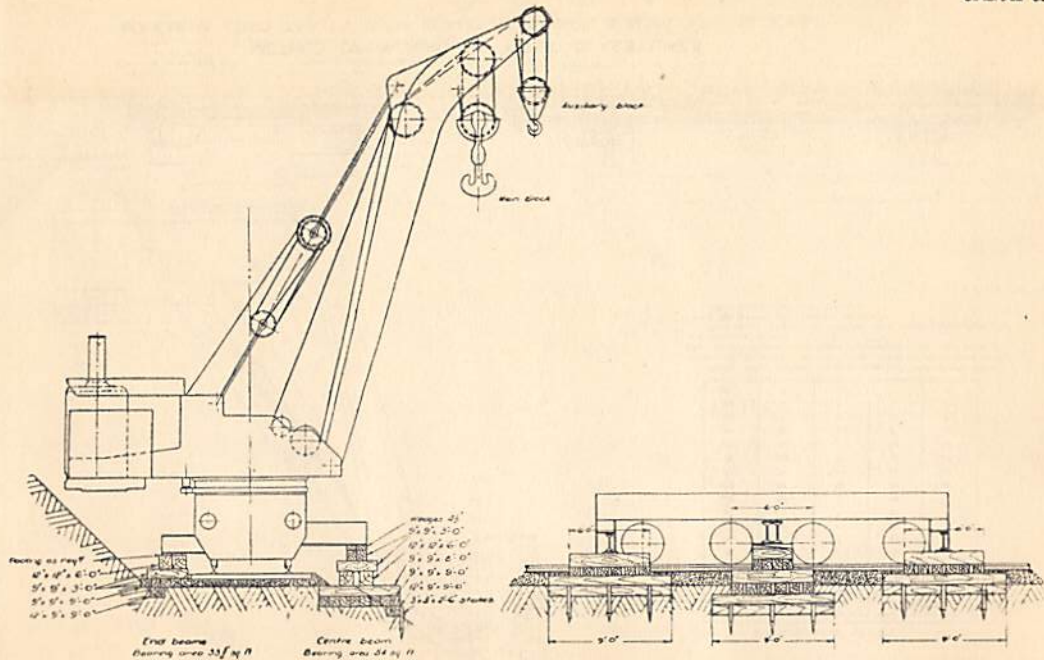
Note - When all beams are fully out, the loads shown must not be allowed to the other side of the crane until the centre beam has been moved out to that side & securely packed.

The loads shown in columns END BEAMS ONLY FULLY OUT may be allowed all round the crane.

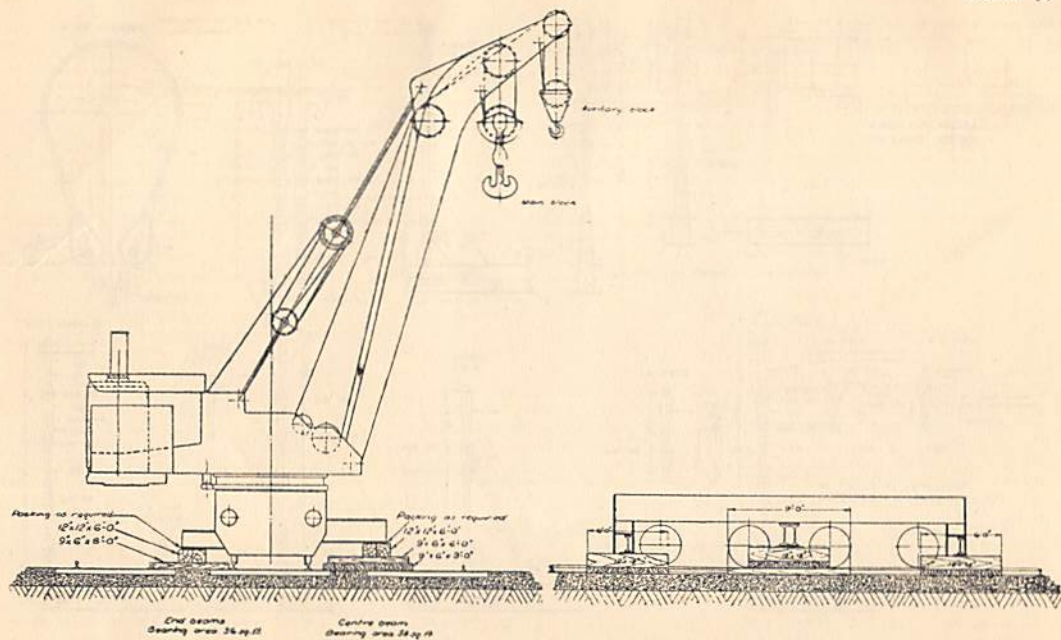
Wet class must be fastened.



METHOD OF PACKING ON FIRST CLASS LINES
MAXIMUM LOAD TABLES WITH BEAMS OUT MAIN & AUXILIARY BLOCKS.



METHOD OF PACKING ON SECOND CLASS LINES



METHOD OF PACKING ON LEVEL TRACKS

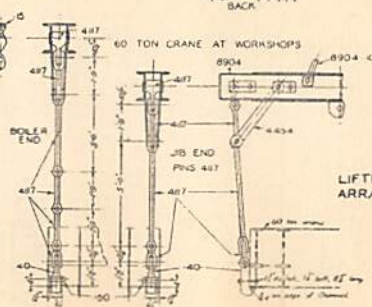
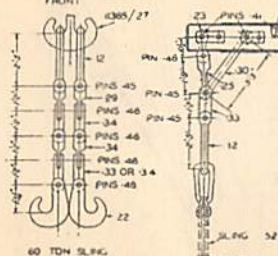
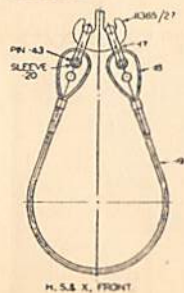
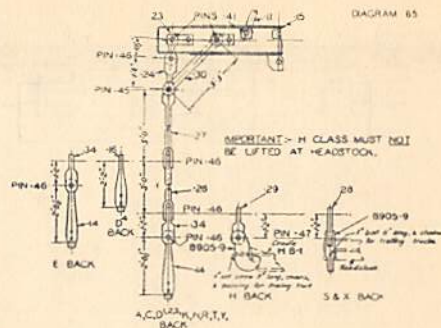
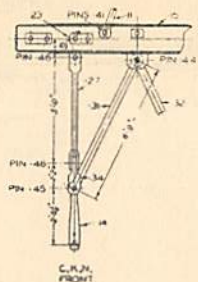
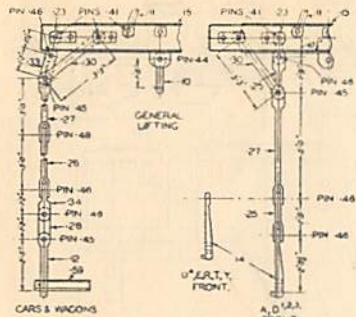


DIAGRAM 85

295. The following working parts must be lubricated as shown in the following tables:—

Cylinder Oil, Saturated Steam.	Caltex Crater Compound No. 2, applied hot.	
<i>Engine</i> steam pipe lubricator $\frac{1}{2}$ pint capacity, and steam starting valve 2.in. ball lubricator.	<i>Steering</i> worm and worm wheels box must contain $1\frac{1}{2}$ in. depth of compound, Derricking worm and worm wheel box must contain $1\frac{1}{2}$ in. depth of compound.	
Locomotive Bearing Oil.	Vacuum N.S. No. 2 Grease for Compression Cups and Ball Bearings.	Gargoyle C.N. Grease Applied Hot to the Teeth and Wearing Surfaces.
<i>Engine</i> reversing lever, steam starting valve lever, 2 reversing shaft bearings, 2 quadrants with 3 holes, 2 die blocks, and 4 hanging links at each end. The 2 crosshead guides, 2 crank pin bearings and 4 eccentric strap oil cups	2 crosshead pins and 2 shaft bearings	Shaft clutch pinion
<i>Lifting Second Motion Shaft</i> lever, 2 clutch shaft bearing brackets, pad, and pinion wheel	2 shaft bearings	Shaft gear wheel and pinion
<i>Main Lift</i> lever, clutch shaft bracket, pin, pad, and pinion wheel	2 barrel shaft bearings	Shaft gear wheel
<i>Auxiliary Lift</i> lever, 2 clutch lever brackets, pad, barrel clutch, and 2 barrel bearings	2 barrel shaft bearings	Shaft gear wheel and pinion
<i>Derricking</i> lever, 2 shaft glands, clutch shaft bracket, pad, clutch, and bevel wheel on cone shaft	3 cone shaft bearings, 3 worm shaft bearings and 2 derricking shaft bearings <i>Worm heavy thrust ball bearing</i>	<i>Engine</i> shaft driving gear wheel cone shaft driven gear wheel, 2 bevel gears, the worm, and barrel worm wheel
<i>Travelling Gear</i> lever, clutch shaft	2 vertical shaft bearings, 4 longitudinal bevel wheel shaft bearings, 4 horizontal bevel and spur wheel bearings on ends of shafts, and 4 horizontal sliding pinion bearings on ends of shafts	<i>Engine</i> shaft bevel pinion, bevel wheel, vertical shaft spur wheel, 2 centre casting bolt spur wheels, 4 longitudinal pinions, 4 bevel wheels, 4 spur pinion wheels and 2 driving axle spur wheels

295. The following working parts must be lubricated as shown in the following tables—*continued*.

Locomotive Bearing Oil.	Vacuum N.S. No. 2 Grease for Compression Cups and Ball Bearings.	Gargoyle C.N. Grease Applied Hot to the Teeth and Wearing Surfaces.
<p><i>Slewing wheel friction clutch screw bracket, screw, nut, lever, stud, 2 fork ends, coil clutch strap, sliding collar centre 2 sides and shaft, 2 spring coils (when clutch is running out of gear), 2 chills, 2 fulcrum pins, 2 mitre wheel bearings and boss faces, 2 feed oil box to 2 vertical shaft mitre wheel bearings, 2 vertical shaft mitre wheel boss faces, 3 feed oil box to crane top centre pin collar, through stretcher casting pipe to radial ring centre bush, and vertical shaft bottom bracket</i></p>	<p>3 worm shaft bearings, 2 worm wheel bearings on top of vertical shaft, 2 vertical shaft pinion bearings and 36 radial ring rollers, 2 <i>worm medium thrust bearings</i></p>	<p>3 coil clutch mitre wheels, 2 mitre wheels on end of vertical shaft, vertical shaft pinion, vertical shaft gear wheel slewing pinion, slewing rack, <i>pathway face</i> and 2 <i>pathway top segment faces</i></p>
<p><i>Strap Brakes main lifting barrel, auxillary lifting barrel, cone shaft slewing mitre wheel, and cone shaft derricking mitre wheel, 4 crossheads, 4 screws, and 4 nuts</i></p>		
<p><i>Main and Auxiliary Lift Foot Brake lever. 2 horizontal shaft bearings, hand wheel screw crosshead and sliding crosshead</i></p>		
<p><i>Hand Brake, 2 hand wheel shafts, 2 screws, 4 spindle bearings, 2 nuts, 6 shaft bearings, and 2 shaft centre levers</i></p>		
	<p><i>Sixty-ton Main Block, 3 pulleys and heavy thrust ball bearing</i></p>	
	<p><i>Sixteen-ton Auxiliary Block, 2 pulleys and heavy thrust ball bearing</i></p>	
	<p><i>Jib Pulleys, 3 main lift, 2 auxillary lift, main guide, and auxillary guide, 2 foot bearings, and 2 trestle roller bearings</i></p>	

No. 296. *Inventory of Tools and Equipment of 60-Ton Wreckage Crane*—continued.

Number.	Item.
<i>Crane Tools</i> —continued.	
2	Balance weight lifting jack handles.
1	Box fog signals.
1	Clinker shovel.
3	Chain hooks for handling chains.
1	Canvas cover.
1	Disc.
1	Double drag chain.
1	Drag chain.
1	Flogging hammer.
1	Length flexible steam tubing, 30 feet.
2	Boiler Klinger gauge glasses.
1	Hand saw.
1	Hand hammer.
1	Hook lamp.
1	Portable lamp and flexible lead.
2	150-watt 32-volts Edison screw gas-filled lamps.
6	15-watt 32-volt Edison screw gas-filled lamps.
1	I.R. hose, 30 feet, for filling crane tanks from tank on trailer.
2	Oil feeders.
1	Set spanners, $\frac{3}{4}$ -in., $\frac{7}{8}$ -in., 1-in., $1\frac{1}{8}$ -in., $1\frac{1}{4}$ -in., $1\frac{1}{2}$ -in., $1\frac{3}{4}$ -in.
1	Pricker.
1	Pinch bar.
1	Scraper for fire.
1	Red flag.
1	Tomahawk.
4	Wedges, wood.
<i>Lifting Gear.</i>	
Each crane must be equipped with the following:—	
1	60-ton lifting beam, 11 ft. $4\frac{1}{4}$ in., fitted with 2 top shackles.
2	60-ton lifting, $10\frac{1}{2}$ in. top links, plain ends.
2	60-ton lifting, 1 ft. 2 in. links, plain ends.
2	60-ton lifting, 1 ft. 2 in. links, plain ends at right angles.
2	60-ton lifting, 1 ft. 2 in. links, plain and fork ends.
6	60-ton lifting, 1 ft. 2 in. links, plain, at right angles.
2	60-ton lifting, 1 ft. 2 in., links, fork ends.

No. 296. *Inventory of Tools and Equipment of 60-Ton Wreckage Crane*—continued.

Number.	Item.
<i>Lifting Gear</i> —continued.	
2	60-ton lifting, 1 ft. 2 in. links, fork ends, at right angles.
2	60-ton lifting, 1 ft. 6 in. links, plain and fork ends.
4	60-ton lifting, 1 ft. 9 in. links, plain and fork ends.
2	60-ton lifting, 3 ft. links, plain and fork ends.
2	60-ton lifting, 5 ft. links, fork ends at right angles.
2	60-ton lifting, 3 ft. 3 in., strut.
2	60-ton lifting, 6 ft. 9 in. strut.
2	35-ton trailing truck hook and 1 in. x 11 in. bolt, S. and X.
2	Set screws, 1 in. x 9 in., for H.
2	30-ton sling hook.
2	25-ton flat hook and $\frac{3}{4}$ in. bolt for engine frame.
2	15-ton flat hook with bent shank and $\frac{3}{4}$ in. bolt for engine frame.
2	44-ton shackle for 75-ton wire rope sling.
1	35-ton shackle, 1 ft. 6 in. x $3\frac{1}{2}$ in. jaw, beam centre.
2	35-ton shackle, 2 ft. 5 in. x $4\frac{3}{4}$ in. jaw, beam hook.
2	35-ton shackle, 2 ft. 5 in. x $2\frac{3}{8}$ in. jaw, beam lift.
2	35-ton shackle, 2 ft. 5 in. x $5\frac{5}{8}$ in. jaw, snatch block.
4	15-ton shackle, 1 ft. 9 in. x 4 in. jaw, wire rope slings with pin $2\frac{1}{2}$ in. x $8\frac{7}{8}$ in. and cotter.
1	75-ton wire rope sling, thimble both ends.
2	15-ton wire rope sling, thimble both ends.
2	30-ton chain slings, double chain, $1\frac{1}{2}$ in.
2	30-ton chain slings, double chain, $1\frac{1}{4}$ in.
2	Trailing truck turnbuckle and chain, 5 ft. 6 in., H., S.300 and X.
2	Trailing truck turnbuckle and chain, 4 ft. 6 in., S.301 to S.303.
2	2 75-ton sling sleeve.
4	Trailing truck clamp plate, $4\frac{1}{2}$ in. x 4 in. x $\frac{1}{2}$ in., and $\frac{3}{4}$ in. x $5\frac{1}{2}$ in. bolts, S.300.
2	Smoke-box lifting sling stops 8 in. x 7 in. x $\frac{3}{4}$ in. for H.
2	Snatch block, complete, with 2 ft. $6\frac{1}{4}$ in. pulleys.
4	12 ft. x 100 lb. lifting rails.
6	Pins, 3 in. x $12\frac{1}{8}$ in., and cotter beam shackle and links.
2	Pins, 3 in. x $11\frac{1}{8}$ in., snatch block.

No. 296. *Inventory of Tools and Equipment of 60-Ton Wreckage Crane—continued.*

Number.	Item.
<i>Lifting Gear—continued.</i>	
2	Pins, 3 in. x 11 $\frac{5}{8}$ in., 44-ton shackles.
1	Pins, 3 in. x 10 $\frac{3}{4}$ in., beam centre shackle.
4	Pins, 3 in. x 8 $\frac{7}{8}$ in., C. and W. lifting shackle and strut.
18	Pins, 3 in. x 7 $\frac{1}{4}$ in., snatch block, eye bars, links

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Add the following items of equipment under "Lifting Gear."

Number	Item
2	15-ton short wire rope slings complete with hooks.

2581-44

<i>Beam Softwood Packing.</i>	
12	12 in. x 12 in. x 6 ft.
6	12 in. x 9 in. x 9 ft.
30	9 in. x 9 in. x 9 ft.
8	9 in. x 9 in. x 6 ft.
32	9 in. x 9 in. x 3 ft.
10	9 in. x 6 in. x 9 ft.
44	9 in. x 6 in. x 6 ft.
18	9 in. x 6 in. x 3 ft.

<i>Hardwood.</i>	
30	9 in. x 4 $\frac{1}{2}$ in. x 3 ft. wedges.
2	5 $\frac{1}{2}$ in. x 5 $\frac{1}{2}$ in. x 8 in. H. trailing truck packing.
20	3 in. x 3 in. x 2 ft. 6 in. stakes pointed one end.

**INSTRUCTIONS Nos. 297 TO 304, APPLICABLE TO THE
30-TON WRECKAGE CRANES Nos. 5 AND 7.**

297. Before starting out from the shed on any journey, and on completing work at any place, the driver must satisfy himself that the crane and match truck are in proper condition to run, and must be careful to see—

- (a) that the jib is lowered and resting securely on the trestle of the match truck, the derricking ropes are slightly slack, and the rear end of the superstructure securely locked by the centreing gear;
- (b) that the beams are in and securely locked with the pins provided;
- (c) that the top part of the chimney of the boiler is lowered and secured in position;
- (d) that the sliding pinion (if the crane is to be hauled) of the travelling gear on the underframes is drawn out of gear and the travelling gear clutch hand wheel is properly secured with the chain and padlock;
- (e) that the relieving screws are raised clear of the springs and the bogie axles, and secured with pins;
- (f) that the axle boxes and all other working parts are properly lubricated, and that the trimmings are in good order;
- (g) that the water tanks are full, the coal bunker full of coal, and everything in proper order and ready for use;
- (h) that the crane and match truck are properly coupled together, and that the brake train pipes are coupled up;
- (i) that the *Air Brake Cock* on the side of the underframe adjacent to the cab for operation in an emergency by an employé travelling on the crane is in working order and that by its operation the brakes are properly applied.

298. Steam may be raised while the crane is in motion. The working pressure of the boiler is 80 lb. per square inch.

299. (a) Before commencing to work the crane all lubricators must be properly attended to, and all working parts thoroughly lubricated. The engine cylinders must be drained and warmed with steam.

(b) Before any lifting work is commenced the sliding pinion of the travelling gear must be out of gear and properly secured in that position.

300. When lifting loads not exceeding 7 tons, the relieving screws over the fixed wheels of the crane must be screwed down to take the weight off the springs, and if necessary to level the underframe.

Care must be taken when the crane is being propelled round a curve that the relieving screws over the bogie axles are clear.

301. When it is necessary to lift loads exceeding 7 tons the following instructions must be observed:—

- (a) The crane must be placed in the position most suitable for dealing with the work;
- (b) all the relieving screws must be screwed down so as to approximately level the underframe;
- (c) the beams must then be out to the position required and the ends securely packed as shown in the Diagrams Nos. 32, 33, 34, and 35 so as to form an extended base to increase the stability of the crane.

The packing must be arranged so that the pressure on the ground is not excessive; up to about 20 square feet under the end of each draw beam will be required for the average ground with the loads as shown on Table No. 31; and

- (d) the rail clips must be securely fastened to the rails.

302. (a) To lift the jib, the clutch marked derricking must be placed into gear and the reversing lever in back gear, and the clip brake then released.

To lower the jib the reversing lever must be placed in fore gear, and the clip brake then released.

(b) When a load is suspended on the crane hook, and the jib is to be raised or lowered, special care must be taken to see that the jib is not lowered beyond the radius shown on the load table for that particular load. The Officer-in-Charge of the crane must endeavour to keep to a minimum the amount of derricking required for loads of more than 7 tons.

(c) When derricking is completed the clip brake must be applied to lock the jib in position and the clutch withdrawn.

(d) To lift loads (slow gear), the pinion marked slow hoist must be placed into gear, and the reversing lever in fore gear. The load may then be held by the brake, and the pinion drawn out of gear and the lowering controlled by the brakes.

(e) To lift loads (fast gear), the pinion marked fast hoist must be placed into gear and the procedure outlined in Clause (d) adopted.

(f) The slow and fast pinions must not be in gear at the same time.

(g) To unwind the hoisting rope, either the slow or fast pinion must be placed in gear, and the reversing handle in back gear; or, alternatively, both pinions must be thrown out of gear and the rope lowered, controlled by the brake.

(h) The slewing is controlled through the friction clutch and the clutch lever immediately below it, the lever being pushed down, and the direction of slewing may be altered by means of the friction clutch or reversing lever.

(i) When the crane is to be self-propelled the load suspended on the crane hook must not exceed the loads shown in Table 31 in the column headed "No beams out."

NOTES.—(a) The gear is operated through the friction clutch and the clutch lever immediately below it, the lever being raised. The direction of travelling may be altered by means of the friction clutch.

(b) The sliding pinion of the travelling gear on the underframe is operated by a hand wheel on the left-hand side, and it must be placed out of gear and secured by the chain and padlock whenever the crane is being moved by an engine attached.

303. (a) The working loads of the crane in the various positions of the jib are shown on the Indicator, and are as follow:—

TABLE No. 31.

Radius of Jib in feet.	Load in Tons.	
	With all Beams out and securely packed.	No Beams out.
18	30	7.0
19	28	6.5
20	26	6.0
21	25	6.0
22	25	6.0
24	22	5.0
26	18	4.0
28	16	4.0
30	14	3.5

(b) When the crane is in such a position that it is not possible or desirable to use the beams out to their full extent, and it is estimated that the loads to be lifted are greater than those allowed by the Load Table for "No beams out" (*vide* Table 31), one of the following methods of increasing the stability of the crane may be used:—

TABLE No. 32.

(i) This Table shows the loads that may be lifted at the various radii of the crane when the

beams are drawn out to various positions up to their full length and securely packed and rail clips secured.

NOTE.—When this method is used the load lifted may be slewed completely round the crane.

Radius of Jib in feet.	Loads in tons for various positions of the Beams.				
	Beams fully out 4 ft.	Beams out 3 ft.	Beams out 2 ft.	Beams out 1 ft.	Packed securely under the sides of the under- frame only.
18	30	24	18	14	10
19	28	22	16	12	10
20	26	20	16	12	9
21	25	18	15	11	9
22	25	16	13	11	8
24	22	15	12	10	7
26	18	14	11	9	6
28	16	12	10	8	6
30	14	11	9	7	5

- (ii) If it is found impracticable to pack under the beams, as shown above, the stability of the crane may be increased by the use of two (2) guy ropes as shown on Diagram No. 36. The ropes are to be clipped to the underframe at about 6 feet on either side of the centre post, and the other ends secured to some suitable object or objects sufficiently strong or heavy enough to stand a pull of 12 tons on each rope. The rail clips must also be properly secured to the rails, and special care must be taken that the load is not slewed past the centre of the track, i.e., the crane must only be slewed half way round on the side opposite to which the guy ropes extend. When this method is used, the loads that may be lifted are double

those shown on Table No. 31, in the column headed "No beams out," e.g., at 18 feet radius a load of 14 tons may be lifted.

(c) All the loads in the above tables are based on the assumption that the load is to be lifted in a vertical direction. When the load to be lifted is in such a position that the ropes from the jib to the hook block will be pulled to an angle with the vertical, the loads that may be so lifted must be reduced as shown in Table 33.

In using this table, the Officer-in-Charge of the crane and operations must use his discretion as to the loads to be allowed in each case, as the ground will sustain a portion of the load until it is brought by the crane into position immediately under the jib pulleys.

TABLE No. 33.

This table is based on the column headed "Beams out" in Table No. 31. The loads shown in Table No. 32 must be reduced proportionately when the load is to be lifted at an angle with the vertical, and the beams are not out to their full extent.

LOAD IN TONS.

Radius of Jib in feet.	Angle of Ropes to the Vertical 15 deg.		Angle of Ropes to the Vertical 30 deg.		Angle of Ropes to the Vertical 45 deg.	
	Beams out.	Beams in.	Beams out.	Beams in.	Beams out.	Beams in.
18	17	4.5	13	4	11	3
19	17	4.5	13	3.5	11	3
20	16.5	4	13	3.5	11	3
21	16.5	4	13	3.5	11	3
22	16.5	4	13	3.5	11	3
24	16	3.5	12	3.5	11	3
26	14	3.5	12	3	11	3
28	13	3	12	3	11	3
30	12	3	11	3	11	3

(d) When it is necessary to lift loads not exceeding 10 tons to a greater height than is possible with the ordinary hook or from a considerable depth below rail level, the 30-ton hook and sheave may be removed and the special 10-ton hook attached to the end of the lifting rope, which must be passed over one of the jib pulleys. The loads must then be dealt with as shown in Tables 34 and 35.

TABLE No. 34.

This table shows the loads that may be lifted at the various radii of the crane by a single rope. When the beams are out they must be securely packed and the rail clips, &c., secured.

Radius of Jib in feet.	Loads in Tons.						With two Guy Ropes.
	No Beams out.	Packed securely under sides of under-frame only.	Beams out.				
			2 ft. 6 in. or more.	2 ft.	1 ft. 6 in.	1 ft.	
18	7	10	10	10	10	10	10
19	6.5	10	10	10	10	10	10
20	6	9	10	10	10	10	10
21	6	9	10	10	10	10	10
22	6	8	10	10	10	10	10
24	5	7	10	10	10	10	10
26	4	6	10	10	10	9	8
28	4	6	10	10	9	8	8
30	3.5	5	10	9	8	7	7

NOTE.—Under the above conditions, except when guy ropes are used, the jib may be slewed completely round the crane.

When guy ropes are used special care must be taken that the load is not slewed past the centre of the track, i.e., the crane must only be slewed half way round on the side opposite to which the guy ropes extend.

(e) All the loads in Table 34 are based on the assumption that the load is to be lifted in a vertical direction. When the load to be lifted is in such a position that the rope from the jib to the hook block will be pulled to an angle with the vertical, the loads that may be so lifted must be reduced as shown in Table 35.

TABLE No. 35.

Radius of Jib in feet.	Loads in Tons.					
	Angle of Rope to the Vertical 15 deg.		Angle of Rope to the Vertical 30 deg.		Angle of Rope to the Vertical 45 deg.	
	Beams out.	Beams in.	Beams out.	Beams in.	Beams out.	Beams in.
18	10	4.5	10	4	10	3
19	10	4.5	10	3.5	10	3
20	10	4	10	3.5	10	3
21	10	4	10	3.5	10	3
22	10	4	10	3.5	10	3
24	10	3.5	10	3.5	10	3
26	10	3.5	10	3	10	3
28	10	3	10	3	10	3
30	10	3	10	3	10	3

When the beams are not drawn out to their full extent, the loads shown in Table 34 must be reduced proportionately if the load is to be lifted at an angle with the vertical.

304. Diagram No. 31 indicates the maximum loads that the crane can lift and propel at the various radii with the beams in.

Diagram No. 32 indicates the maximum loads that the crane can lift at the various radii.

The beams must be fully out and securely packed under the ends. If for any reason the beams cannot be fully out, they must be drawn out as far as possible and securely packed, and the loads reduced as shown in Table No. 32.

Diagram No. 33 indicates the method of packing under the beams of the cranes on first class lines.

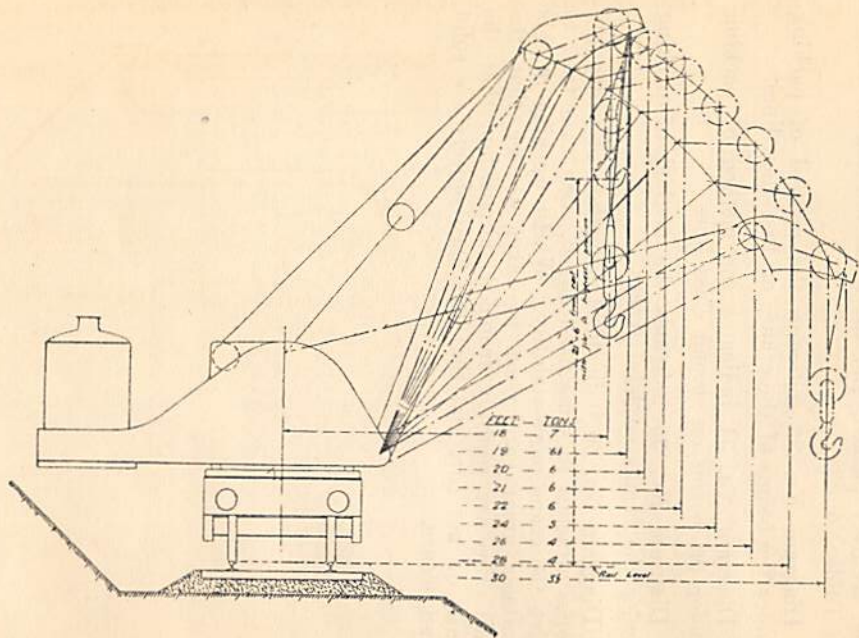
Diagram No. 34 indicates the method of packing under the beams on second class lines.

Diagram No. 35 indicates the method of packing under the beams on level tracks.

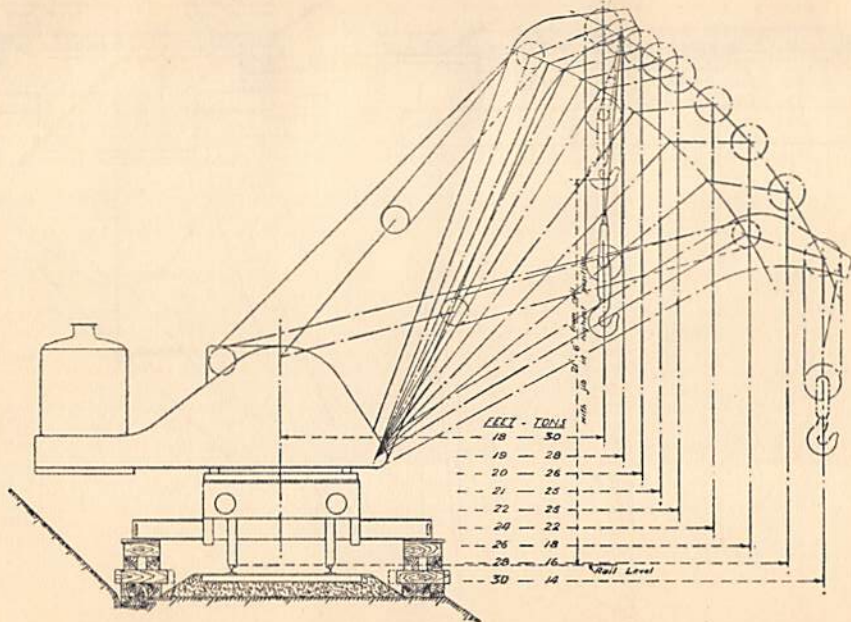
Diagram No. 36 indicates the method of using guy ropes attached to some fixed object, such as a tree, to give the crane more stability. Whilst working in this manner great care must be taken to see that the rail clips are securely fastened in position, that the rails do not lift, and that the fixed objects are solid and secure.

MAXIMUM LOAD TABLE WITH BEAMS IN

DIAGRAM 31



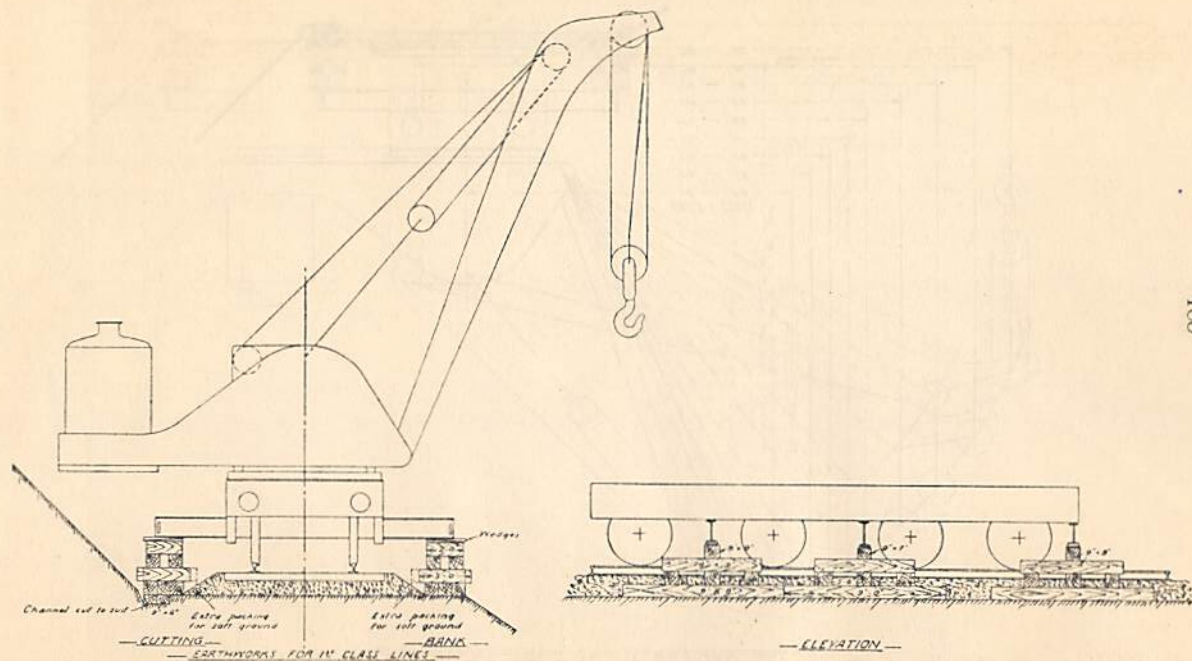
Note. The Crane may be propelled with the load where required.



*Note. Beams securely packed and rail clips fastened
The Crane cannot be propelled with the load.*

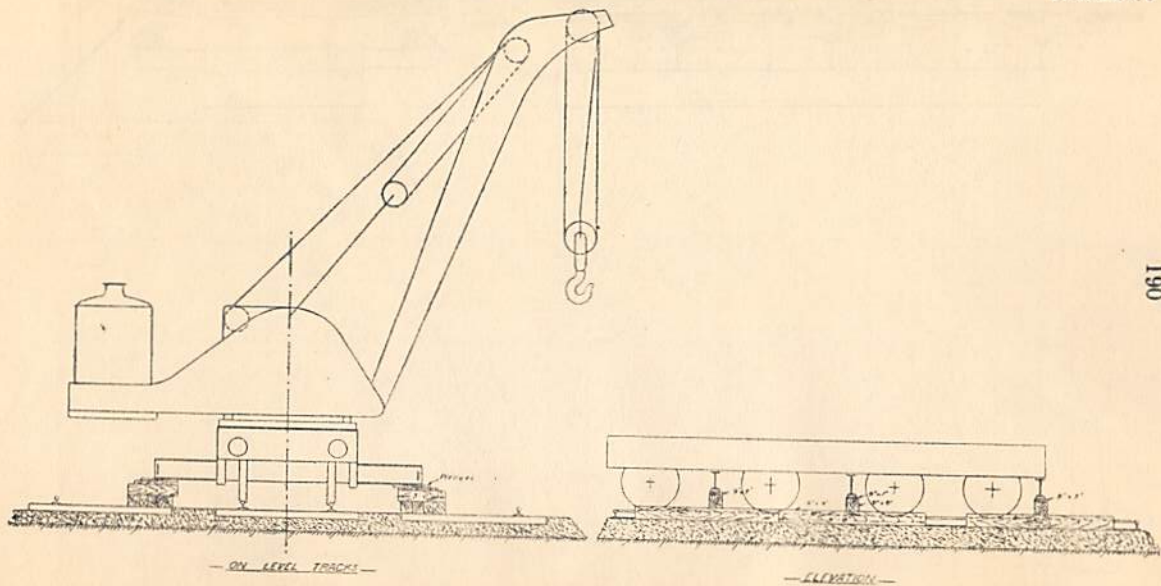
METHOD OF PACKING ON FIRST CLASS LINES

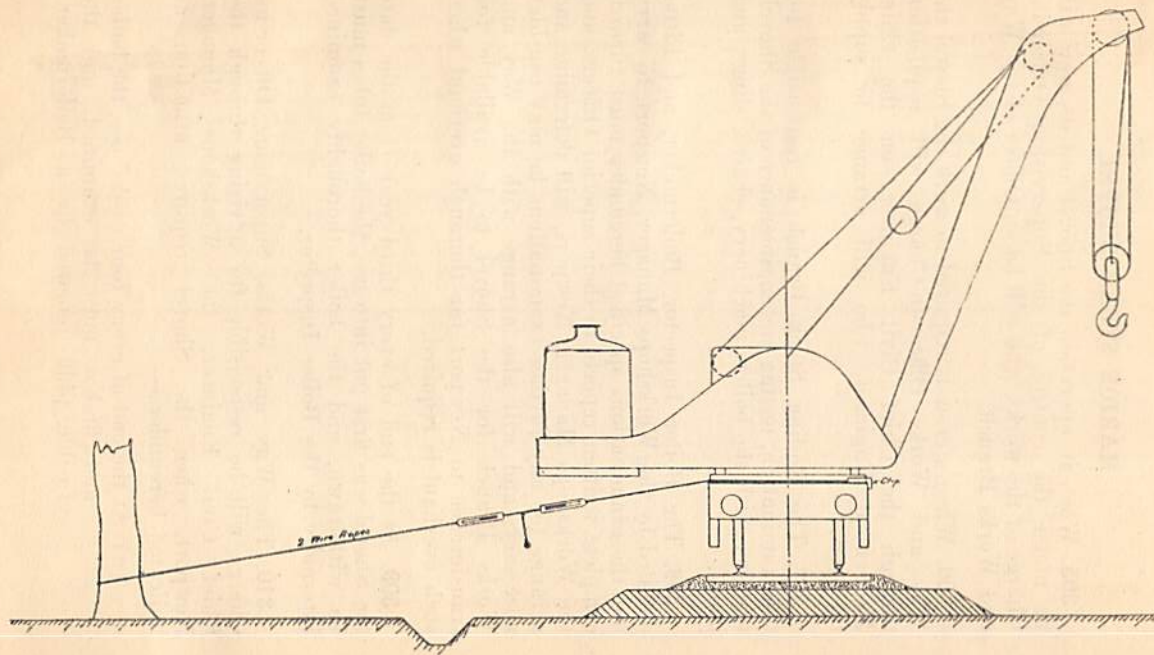
DIAGRAM 33



METHOD OF PACKING ON LEVEL TRACKS

DIAGRAM 35





MARION STEAM SHOVEL.

305. When in operation the Shovel and its crew will be under the control of the Supervising Officer-in-Charge of the works, who will be an Officer of the Way and Works Branch.

306. When a crew is required to work the Shovel the Way and Works Officer-in-Charge will requisition through the Chief Civil Engineer, on the Chief Mechanical Engineer, who will arrange to supply the crew.

307. The Rolling Stock Branch is responsible for the examination, testing and maintenance of the Shovel, together with the boiler, machinery, chains, slings, and hooks.

308. The Boiler Inspector, Boilermaker, and Fitter detailed by the Workshops Manager, Newport, to carry out the examinations specified hereunder must furnish complete written reports to their superior Officers, and the Workshops Manager, Newport, will determine and arrange for any further examinations he may consider necessary, and will also arrange with the Way and Works Branch for the Shovel to be available for transference to Newport for thorough overhaul when such overhaul is required.

309. At the end of every third year from the date the Shovel was first put into use, the boiler tubes must be withdrawn, and the boiler thoroughly examined internally by the Boiler Inspector.

310. The Way and Works Supervising Officer-in-Charge will be responsible for advising through the Chief Civil Engineer, the Workshops Manager, Newport, when the Shovel requires attention as indicated hereunder:—

- (a) At the end of every four weeks' use, the boiler and firebox must be examined, and the fusible plug renewed by a Boilermaker;

the hoisting, racking, and slewing gear, and the links of the hoisting chain where they work on the sheaves and the drum, must be examined by a Fitter.

- (b) At the end of every three months' use, the safety valves and pressure gauges must be tested and checked, and the safety valve connections examined, cleaned and oiled by a Fitter.
- (c) At the end of every six months' use the lifting chain must be tested and annealed.
- (d) At the end of every 12 months' use the boiler must be examined inside and out by the Boiler Inspector, and at every alternate examination (i.e., every two years) the boiler must also be tested to 25 per cent. above working pressure.

311. The Senior Driver of the crew must see that the whole of the working parts are properly lubricated (the hoisting chain to be lubricated with a suitable grease or heavy bodied oil), that the steam and water pipe joints and valves are all kept tight, and that the piston rods and valve spindles are properly packed. He must also see that the instructions for the care and management of the boiler are observed.

312. The Driver must remove the firebars and clean the ashes from the ledge which supports the firebox at least once a week, in order to prevent wear and corrosion of the firebox plates.

313. When the Shovel is not in regular use the water in the boiler must be run off and sufficient plugs or mud-hole doors removed to allow a current of air to pass through the boiler.

314. The Steam Shovel must not be run on to any main line for transportation until arrangements for the journey have been made with the Transportation Branch.

315. The speed of the Shovel when being transferred from place to place must not exceed 15 miles per hour, and the Shovel must be run in daylight only.

316. Before the Shovel is allowed to run on a main line, the jib must be lowered on to the "Q" truck fitted for the purpose. The running and draw-gear are to be examined, the wheels gauged, and the axle-boxes and brasses put in good order and properly lubricated by a Rolling Stock Branch Fitter, who must also travel by the train to which the Shovel is attached; and it will be the duty of the Way and Works Branch to advise when such services are required.

