

WMcK/GB. First issued - March, 1939. Revised - 1950. Re-issued: GEELONG ELECTRIC TRAMWAYS. LOCAL INSTRUCTIONS ISSUED IN CONJUNCTION WITH COMMISSION'S RULES GOVERNING EMPLOYEES. 1. Motormen and conductors are required to be conversant with the Bay-laws of the State Electricity Commission relating to tramways.

2. Preparing Tram for Traffic.

Motormen must examine the tram allotted to them for any defects. lighting circuit tail lights must be tested; examine sanding device and see that the sand containers are filled; the air pressure gauge must be checked to see that a full working pressure is present in the reservoirs. See that the tram is equipped with two point shifters, point scraper, gong punches, draw-bar, angle iron, insulated cable, lifting jack, oil lamp, 2 spare fuses (lighting and compressor), 1 spare lamp and earthing spade, as motormen are held responsible for tram equipment after the tram leaves the Depot.

Motormen may ascertain the number of tram allotted to them, and its position in the Depot, by inspecting the Tram Roster Board on the east wall. The disc indicating the number of the tram must be removed from "Cars in Depot" side of the Board, and placed over the corresponding disc on the "Cars for Service" side of Board.

3. Departure and Duty before moving Tram in Depot. Motormen and conductors must be ready to leave Depot at schedule time. Before moving the tram, motormen must be careful to first ensure that no member of the Depot staff is working either in, on, or under the tram. In addition to this precaution, the foot gong must always be sounded as a general warning before tram is moved.

Speed of Trams running to the Depot at Night. Motormen are warned against driving trams at excessive rate of speed when going to the Depot at night. Trams must be left in the Depot with the hand-brakes firmly applied.

Trolley pole must be removed from overhead wire, both canopy switches left in "Off" position, controller key and air brake handles removed and placed on window ledge, and all tail lights switched off.

5. Cutting out Defective Motors.

If a tram develops a fault which causes the automatic switch to open when series power is applied, usually No.1 motor should be cut out of circuit in the controller, and if the switch opens when parallel power is applied, No.2 motor should be cut out. See that the automatic or contact switch on bogie trams is open before opening the controller case to make the necessary adjustment.

Trams Nos.1 to 10, and 16 to 26, are equipped with W.H. controllers, and motors are cut out of circuit by lifting one finger on the reversing drums which number 1 or 2 as the case may be. Care must be taken to see that the small catch on the finger holds it from contact position. These trams start on the first parallel notch with only one motor in circuit.

Trams Nos.31, 32, 33, 34, 35 and 36 (bogie trams) are equipped with G.E. controllers. In the bottom right hand side of controller are two knife switches, the top one marked No.2 and the bottom No.1. To cut out either motor, withdraw switch blade from existing contact, swing over and press into opposite contacts.

With either motor cut out, bogie trams would travel on series positions of controller only.

6. Brakes.

The following defines the brakes available on all trams :-. .

. .

Service Brake

Hand Wheel Brake

Emergency

Air Brake Full Air Brake

6. Brakes. (Continued).

In the event of the failure of the air brake and there being insufficient time to bring the tram to a standstill with the hand brake, it is possible to stop the tram electrically.

Pull the reversing key back so that it is pointing in the opposite direction to that in which the tram is travelling and apply power on the first notch in series and, in any case, not beyond the second notch. Should the retarding effect not be sufficient through the wheels spinning too fast, cut the power off and apply again, and repeat this process if necessary, until the tram stops.

Should the circuit breaker open through the reversal of the motors, throw the power handle round to the last parallel position and leave it there until the tram is brought to a standstill. Remember! This operation is useless when a motor has been cut out.

In each of these two cases, sand should be applied until the tram comes to rest. It is important to note that in each of these two cases, the reversing key must be pointing in the opposite direction to that in which the tram is travelling, and neither of these two means will hold the tram in a stationary position so that, having been brought to rest when the wheel brake is useless, it would be necessary to put something in front or at the rear of the wheels to prevent the vehicle from moving unless on level track.

- 7. Reporting Use of Electrical Braking.

 Motormen are required always to report the use of any electrical braking on the "Daily Report as to Condition of Tram" form.
- 8. Reporting Tram Defects.

 Motormen are required to fill in a "Motorman-Conductor's Daily Report as to the Condition of Tram" form intelligently and completely, whenever faults develop, and so enable speedy location of the defects by the Depot staff. This includes condition of the tail lights.
- 9. Reporting Roadway Excavations.

 Motormen are required to report to the first Inspector met, or to the

 Track Foreman, any instances of road excavations being made on or adjacent
 to the tram tracks.
- Delays of more than three minutes' duration should be reported on the "Running Journal", time and cause given.
- 11. Compulsory Stopping Places.

 Motormen are required to be familiar with the compulsory "All Tram Stops" throughout the system. These are distinguished by a 3 inch white band around the pole in the centre of the red section in the service stop sign. All trams must be brought to a standstill at these stops.
- 12. Sectional Insulators.

 Motormen are required to be familiar with the location of all sectional insulators throughout the system, and must switch off power when passing through, so as to avoid excessive arcing.
- 13. Absence of Relief.

 In the event of a relief man being absent at the appointed time, the motorman or conductor is required to carry on until relief is obtained.
- 14. Derailments.

 In the event of a serious derailment, it is the duty of the motorman concerned to 'phone the Tram Depot from the nearest telephone. All derailments must be reported in writing to the Senior Traffic Inspector.
- 15. De-wirements.

 The motorman must report to the first Inspector met, or Overhead Foreman, all instances of the trolley pole leaving the overhead wire.
- 16. Standing by Trams.
 When circumstances require the detention of trams for extra traffic or such causes, motormen and conductors must not leave their trams, and must be ready .../3.

- 16. Standing by Trams. (Continued). ready to respond immediately to signals or instructions.
- 17. Conductors.

 The conductor shall not enter into conversation with the motorman while the tram is in motion. When not collecting fares, his position is on the rear platform.
- 18. Processions &c.

 Militia, funerals, ambulances and fire brigades, always have the right of way, and when they are approaching or passing, trams must be kept under complete control. When a procession of any kind is crossing a tram track, trams must not proceed beyond the building line or near side of street down which the procession is passing.
- 19. Trams with Pole at Each End.

 The two poles must not be on the trolley wire at the same time when the tram is in the vicinity of a sectional insulator. When the tram is standing in a position which allows the two trolley wheels to be on the wire one on each side of the sectional insulator a bridge is formed and a section which is deemed to be "dead" will be made "alive".

 The danger in connection with carelessness regarding this instruction

cannot be too strongly emphasized, and it might result in serious injury.

All trams travelling in either direction must be brought to a standstill not closer to the crossing than the concrete block placed in the track centre at approximately 40 feet from the crossing. No attempt shall be made to move a car beyond the aforesaid concrete block until the conductor from centre of crossing gives the "all clear" signal. When a train or part thereof, is being operated in the vicinity of the crossing, the tram must be kept stationary until the railway vehicle has been brought to a stand-still and the man in charge signals that all is clear by waving his arm or, at night, his hand lamp. The speed of trams when crossing the railway line must not exceed a walking pace. Conductors must not give the signal to proceed until they know all is clear.

Motormen-conductors on one-man operated trams, after stopping, must look both ways and satisfy themselves that all is clear before proceeding across the railway line.

Public or Private Telephones.

When a public or private telephone is used to report an accident or unusual occurrence, and a fee for using same has to be paid, motormen or conductors may take the amount which is usually 2d., from their change and will be re-imbursed on making application to the Office.

ELECTRICITY SUPPLY DEPARTMENT - 'phone No.5941
with connection to residences of :Branch Tramways Superintendent (through the switchboard),
Senior Traffic Inspector - Through the switchboard,
Depot Foreman (through the switchboard),

Overhead Foreman (through the switchboard), Overhead Sub-Foreman (through the switchboard).

22.

Automatic Signalling Apparatus.

Signal boxes have been placed on the north-east corner of Aberdeen and Pakington Streets, north-east corner of Autumn and Pakington Streets, West Geelong route, also on the centre poles in the McKillop Street and Viaduct loops, Belmont route.

The signal system is operated by the contact of trolley wheel with insulated strips called contactors; those in the position of a tram about to leave a loop are known as setting contactors, and those near the entering end of the loop are restoring contactors. The necessity for the trolley wheel remaining in contact with the trolley wire when running through the contactors requires that the speed of the tram shall not exceed 6 m.p.h. and, to avoid arching, power should be cut off at controller.

The arrangement of the signal is such that when a RED light is showing

22. Automatic Signalling Apparatus. (Continued).

at one end of a single track section, there must be a GREEN light showing at the other end, and vice versa. It is necessary for motormen to understand clearly, that these signals are a self-operated system and give only an indication of the condition of the section of single track concerned. When no light is showing, it indicates that the section is empty of trams. When a RED light is showing, it indicates that there is a tram in the section moving towards the RED signal. When a GREEN light is showing, it indicates that there is a tram in the section moving away from the GREEN signal.

It is to be understood that a motorman arriving at a loop and finding a RED or GREEN light showing, is not free to proceed any further until the tram in the section concerned restores the signal to blank (no lights). When the signals are blank (no lights) the movement of the trams under the contactor near the leaving end of the loop gives the GREEN signal and the motorman is then all clear to proceed to the next loop. A motorman must not proceed into a section of single track controlled by signals unless he himself sets the GREEN (all clear) signal.

The location of contactors and signal boxes is arranged so that should the GREEN signals not be obtained or a RED signal light up, the tram can be stopped before arriving at the points at the leaving end of the loop. In the former instance, no light would indicate one of the two faults:-

- Trolley wheel did not make the necessary contact with contactor.
- 2. That the signal circuit is out of order.

To prove which fault exists, the car must be reversed so that the trolley wheel runs back into the contactor. If still no signal, this would indicate a fault in the signals. In this case, word should be sent at once to the traffic office, then it will be necessary to proceed with extreme caution, keeping in mind where other trams are to be expected.

If, in passing over the contactor, a RED signal appears, this indicates that another tram has entered into the section from the opposite end first and, inasmuch as the tram has passed the setting contactor, it will be necessary to return to the contactor so that a signal be obtained as soon as the other tram arrives and clears the RED signal.

In connection with trams running in duplicate, such as to and from the depot, in which case the first tram will operate and clear the signal, the general rule to be observed is that no motorman will follow another tram through a single track section unless he is within 80 yards of the preceding tram and has advised the motorman of the preceding tram accordingly. If a greater distance separates trams, the second tram must wait until the first tram clears the signal before it enters and obtains its own proceed signal. Thus the showing of a GREEN light does not give "all clear" unless it is switched on by the tram entering the section or, as stated, the second tram is within 80 yards of the tram which did operate the signal.

If power goes off, all signals are put out immediately, and in this respect the resumption of power requires special consideration as follows:

When a tram is in a signal controlled section and power goes off, the motorman must realise that the RED signal will not be showing at the loop he is approaching, and with continuous use of gong around any curves and blind spots, and by extremely cautious driving, he will resume his progress through the section. There must be no attempt at this juncture to make up any lost time.

Similarly, the motorman of any tram not in a signal controlled section when power goes off must, upon resumption and approach to signal controlled section, make as certain as possible that there is no tram in the section he is about to enter by referring to time schedule, and as to where other trams are normally passed, then proceed very cautiously, and by use of gong and reduced speed in blind areas, be prepared to stop at the shortest notice.

In order that all motormen be aware that power has been off, the power - if interrupted at the Power Station - will not be restored in less than one minute in day-time, but it must be kept always in mind that even a

22. Automatic Signalling Apparatus. (Continued).

momentary cessation of electric supply or an open circuit, such as a burnt out lamp in the signal circuit which any particular tram has closed, could result in two trams being in the same section of single track and travelling in opposite directions. Therefore, extreme care must be used while travelling on any single track section; dependence must not be placed wholly on the signal lamps.

23. Automatic Indicator at West Terminus.

An indicator which is automatically controlled, both for the switching on and off, is placed on the Telegraph Bridge adjacent to the West terminus. The object of this indicator is to acquaint people on the east side of the Bridge with the fact that a car is approaching or waiting at the terminus.

method of Stopping trams when out of control. In the event of a motorman suffering from a seizure of any kind and having fallen across the controller, the conductor must - 1. Remove disabled motorman from off the controller, open switch. 2. Then apply hand brake firmly. 3. Communicate with the Tramway Depot by telephone, unless a Traffic Inspector is available.

TRAMCAR BRAKING.

The following is a brief description of the air-brake system and advice regarding all air brake trams owned by the Commission.

- 1. An electric motor compressor pumps air into two reservoirs where it is is stored for use by the motorman as required.
- 2. The governor, which is actually an electric switch, is automatically controlled for the "on" and "off" positions by the amount of air pressure in the reservoirs, so that when the pressure drops to the predetermined minimum figure the switch closes and the compressor motor starts up and when the predetermined maximum figure is reached, the switch opens and the motor ceases to pump. This governor, therefore, maintains the required pressure in the reservoirs under normal conditions.
- 3. By the use of the motorman's brake valve handle (which can be likened to a tap) the motorman can, by turning the handle to the right, allow air to pass from the reservoirs to the brake cylinder, the piston of which through a system of levers, forces the brake shoes on to the wheels.
- 4. The gauge in each motorman's cabin indicates the air pressure in the reservoirs which is always the same in each, being connected by an equalising pipe. The importance of the motorman watching the gauge should be obvious and should the pressure drop below 50 lbs. the hand brake must be used until the tram is taken from service. It is important that motormen be familiar with details of the compressor electrical circuit so that they may rectify minor faults, such as replacement of fuse, &c.
- 5. The hand brake is a mechanical means of applying the shoes to the wheel and, although thoroughly reliable, it is slower and not so easy to apply as the air-brake.
- 6. The maximum braking effect is obtained when the pressure on the shoes will almost skid the wheels under conditions that give the greatest grip between the wheels and the rails and our air-brake has been so designed as to give this required effect. This fact cannot be too strongly emphasized as some motormen have resorted to other means of stopping their trams with results which have been far from satisfactory.
- 7. Continual daily practice in the intelligent use of the brake should fit motormen to deal with each situation of varying conditions that arise such as speed, load, and rail condition, but one outstanding feature may be stated with profit and we will treat the subject on the assumption that the rail condition is good at the time.
- 8. The greater the speed the less risk of skidding the wheels, therefore, at high speed a heavier application of the brake can be made than when travelling at lower speed and, as the speed decreases, the pressure on the shoes must be reduced by allowing some of the air to

TRANCAR BRAKING. (Continued).

- 8. Continued.
 - be exhausted from the brake cylinder through the brake valve by turning the handle to the left.
- 9. From the foregoing paragraph, it will be seen that in an emergency, in order to stop the tram as quickly as possible, the handle should be turned instantly to the right to an extent in proportion to the speed, that is, at full speed it should be turned to the full extent, which is the full emergency position.
- 10. In case of emergency when the rails are slippery, a brake application must be instantly made to the maximum extent consistent with the rail condition. Should the wheels lock and skid, release the brake momentarily and instantly re-apply - but to a lesser extent than previously - and repeat if necessary until the tram is brought to a standstill or the danger is past. Sand must be applied throughout the period of braking.

In the event of the failure of the air brake and there being insufficient time to bring the tram to a standstill with the hand brake, it is possible to stop the tram electrically :

Pull the reversing key back so that it is pointing in the opposite direction to that in which the tram is travelling and apply power on the first notch in series, and, in any case, not beyond the second notch. Should the retarding effect not be sufficient through the wheels spinning too fast, cut the power off and apply again, and repeat this process if necessary, until the tram stops.

Should the circuit breaker open through the reversal of the motors, throw the power handle round to the last parallel position and leave it there until the tram is brought to a standstill. Remember! This operation is useless when a motor has been cut out.

In each of these two cases, sand should be applied until the tram comes to rest. It is important to note that in each of these two cases, the reversing key must be pointing in the opposite direction to that in which the tram is travelling and neither of these two means will hold the tram in a stationary position so that, having been brought to rest when the wheel brake is useless, it would be necessary to put something in front and at rear of the wheels to prevent the vehicle from moving unless on level track.

ALL MOTORMEN BEFORE TAKING UP DUTY, MUST BE FAMILIAR WITH THE FOLLOWING QUESTIONS AND ANSWERS.

QUESTION 1. What is the purpose of the compressor?

To pump air from the atmosphere into the reservoirs. Answer:

QUESTION 2. What is the governor and its purpose?

The governor is an electric switch for automatically opening Answer: and closing the circuit to the compressor motor.

At what pressure does the compressor commence to work? QUESTION 3.

Tramcars Nos.1 to 10 commence at 60 lbs. Answer:

" 60 lbs.
" 65 lbs. Nos.24 to 26 "

Nos.16 to 23

" 50 lbs. -11 Nos.31 to 36

At what pressure does the compressor motor cease working? QUESTION 4.

Tramcars Nos.1 to 10 cease at 75 lbs. Answer:

Nos.24 to 26 " " 75 lbs. Nos.16 to 23 " " 80 lbs. Nos.31 to 36 " " 70 lbs.

11

QUESTION 5. When you know that electricity is in the overhead wires and the compressor does not work, what would you do?

Answer: Make sure that the compressor switch is closed and, if so, examine the fuse.

QUESTION 6. Before replacing a burnt out fuse, what precaution would you take?

Answer: Open the compressor switch.

QUESTION 7. What is the purpose of the motorman's brake valve?

Answer: It has a dual purpose; firstly to allow the air to pass from the reservoir to the brake cylinder; secondly to exhaust the air into the atmosphere from the brake cylinder.

QUESTION 8. What is the purpose of the two air gauges situated one in each motorman'c cabin?

Answer: To indicate the pressure in the air reservoirs.

QUESTION 9. What is the hand brake?

Answer: It is a mechanical brake by which the motorman can, by turning the wheel, force the shoes on to the wheels.

QUESTION 10. When is the hand brake to be used?

Answer: In the event of the failure of the airbrake, and when leaving a tram at the termini or elsewhere.

QUESTION 11. Under what condition could the brake be automatically freed from the wheels when standing?

Answer: When a lightly loaded tram picks up a number of passengers.

QUESTION 12. What is the reason for this automatic freeing of the brake shoes?

Answer: When the weight is applied to the tram, the shoes are forced down vertically and at a tangent from the wheels.

QUESTION 13. Under what condition could the brake of a standing tram automatically tighten when the brakes are on?

Answer: When a heavily loaded tram discharges a great number or all its passengers at the one time. In this case the shoes rise vertically toward the centre line of the wheels resulting in greater pressure between the shoes and the wheels.

QUESTION 14. Which is the most effective brake?

Answer: The air brake.

QUESTION 15. Under what conditions should a heavy application of the air brake be made?

Answer: When the tram is travelling at speed and the rail is in good condition.

QUESTION 16. What is meant by the rail being in good condition?

Answer: When the adhesion between the wheel and rail is good.

QUESTION 17. Under what conditions would the adhesion be best?

Answer: When the rail is thoroughly clean and wet.

QUESTION 18. When is the rail slippery?

Answer: Generally after a light rain or when there is any substance on the surface such as oil, tar, leaves &c.

QUESTION 19. What would you do to counteract this slippery condition if wheels skid?

...../8.

QUESTION 19.

Answer: Apply sand to the rails by pressing on the sander button and releasing brake momentarily to allow wheels to revolve.

QUESTION 20. Is it your duty to see that the sand hoppers have plenty of sand and that the apparatus is working satisfactorily?

Answer: Yes. These should be frequently examined, especially under conditions that are likely to make the rails slippery.

QUESTION 21. What is the minimum (lowest) air pressure at which you are permitted to use this brake?

Answer: 50 lbs.

QUESTION 22. What precaution would be necessary when running a tram under this condition?

Answer: A greater distance must be allowed in which to bring the tram to a standstill as the force on the shoes would be somewhat reduced.

QUESTION 23. Would you be permitted to travel as fast with the air brake out of order?

Answer: No. It would be necessary to travel more slowly and to allow plenty of time in which to bring the tram to a stand-

Answer: By pulling the reversing lever back and applying one notch of power, or if necessary, two, at the same time using sand.

QUESTION 25. What would be necessary if the wheels spun round too fast and did not grip the rails sufficiently?

Answer: Throw the handle to the off position for an instant and apply the power again, repeating the process if necessary until the tram has been brought to a standstill.

QUESTION 26. If the circuit breaker opens when the motors are reversed, what should be done?

Answer: The power handle should be immediately thrown round to the parallel running position and left there until the vehicle comes to rest.

QUESTION 27. Should sand be used when either of these two electrical means are used to stop the tram?

Answer: Yes; and should be used continuously until the vehicle comes to rest.

QUESTION 28. If the tram is running backwards downhill, how would it be stopped?

Answer: In the same manner as described above except that the reversing key would be pointing in the opposite direction, that is, it must always be pointing in the opposite direction to that in which the tram is travelling.

QUESTION 29. How would a tram be kept from moving on a grade after having been stopped when there was no air or hand brake to hold it?

Answer: Some hard substance would have to be placed in front or rear of the wheels, such as a big stone, a piece of wood, drawbar, &c.

QUESTION 30. If necessary to leave a tram unattended on a grade, what action would be necessary?

Answer: Release air-brake and apply the handbrake firmly, open the automatic switch, push the reversing key so that it is pointing up the grade and turn the power handle round to the last parallel running position after removing the trolley pole if daylight.

QUESTION 31. How would a tram descend a grade if both air and hand-brakes failed?

Answer: The circuit breaker should be opened, the reversing key pulled back, that is pointing up the grade, and the power handle turned round to the last parallel position and left there until the tram comes to rest on the level track.

QUESTION 32. With this means of stopping a tram, would it hold it in a stationary position?

Answer: No, as the electricity used in stopping it is dependent on the motion of the tram to generate the current.

<u>Answer:</u> The two motors are cross-connected so that the one is driven by the momentum of the tram and generates electricity supplied to the other motor which retards or stops rotation.

QUESTION 34. Would it be possible to use this means of stopping the tram when one of the motors had been cut out?

Answer: No. As previously explained, it is necessary to have the two motors in working order and cross-connected.

QUESTION 35. Would this means of stopping a tram be effective if the pole were off trolley wire, or if the electricity was off for any reason?

Answer: Yes. It is not dependent on power from the trolley wire.

QUESTION 36. If wheels skid when brake is applied, what must you do?

Answer: Release brake momentarily in order to allow wheels to revolve, apply brake more gently and use sand.

QUESTION 37. Under what conditions must you allow a greater distance in which to stop tram?

(a) When tram is heavily loaded.

(b) When on down grade.(c) When rail is slippery.(d) When using hand brake.

Answer:

(e) When approaching any obstruction.