

CODE OF PROCEDURE FOR USE IN EMERGENCIES INVOLVING TRAMS.

PART I: GENERAL PROCEDURE.

INTRODUCTION:

The prime duty of the Emergency Vehicle Crew is to clear the tracks for the passage of trams - quickly - safely - obeying all legitimate rules and directions.

Quickly, by learning, practicing and applying the procedures described in this code and by working as a team, directed by its Charge Hand.

Safely, observing safe practices. The Charge Hand is responsible for ensuring that all work is carried out safely and must guard the safety of the crew, passengers and by-standers.

Obey, legitimate rules and directions. The Charge Hand and any driver under his control shall observe and obey all Regulation of the Victoria Road Traffic Act - the "Rules of the Road" - except when under Police escort. When driving trams in traffic, Emergency Vehicle Crew Drivers must obey all rules in "Instructions to Drivers in Electric Tram Operation".

Except when the Police are in charge and providing no person has been injured or killed, authorized employees have the power to clear obstructions from the track. When Police are in charge, however, permission must be obtained before vehicles are moved; if this is refused, the Policeman's number must be taken and a complete report including the time of the extended delay must be made for the Depot Foreman to pass on to the Assistant Works Manager. and the second of the second s

Remember that the emergency equipment is only as good as the crew that uses and maintains it. It is the first responsibility of the Charge Hand to make certain that the vehicle has sufficient fuel and that the equipment provided is complete and in good working condition. It is the responsibility of the whole crew to study this equipment. Remember, too, that it is not sufficient to use the hands alone - think, and plan ahead!

CLEARING THE TRACKS:

When an emergency occurs resulting in the delay of tram services, your prime duty is to restore those services - as quickly as possible. Endeavour to restore the greater service first. Where possible, clear the track carrying maximum passenger traffic first the "up" track in the morning, the "down" track in the afternoon. Use crossovers where available. Intersections must be cleared quickly and free passage provided for motor vehicles if possible.

When the delay is caused by a tram, try to clear the <u>obstruction by driving</u>, before using heavy equipment. In general, it is preferable to drive the tram in the reverse direction from that in which it was moving prior to a derailment or collision.

Don't hold up traffic while attempting to trace a fault. In peak conditions or other busy traffic, a faulty tram can be pashed by the following tram and fault tracing can continue - with some faults the tram may even be driven.

The emergency crew <u>must take any reasonable risk judged</u> <u>necessary to get traffic moving</u>. Lost time means bad publicity and costs money. If necessary and the situation warrants it - peak conditions, busy track, but <u>not</u> at a terminus - it is better to cause additional damage to motor vehicles or trams than to delay the service. If a defective tram has been temporarily repaired by traffic personnel and is proceeding safely under its own power, <u>let it proceed</u> to the nearest Depot or, if it is at a terminus, inspect it and make such repairs or adjustments that will allow it to be returned to traffic or changed over at the nearest depot.

When an unserviceable or badly damaged tram has been taken to a shunt during a peak period it is generally preferable to leave it there until the peak is over. If there is insufficient room for service trams at the shunt, it is frequently possible to partially derail the tram over the end of the track.

FAULT FINDING:

The best form of trouble shooting is preventive maintenance. If parts are kept clean, especially where dirt may collect and cause creepage and flashovers, if parts are kept in proper adjustment, are properly lubricated, are replaced when badly worn, faults are unlikely to occur. Most electrical troubles are of a mechanical nature, anyway, and equipment in good mechanical condition is not liable to give trouble.

When fault finding, remember first that the only fault which can't be found is the one that doesn't exist; so, make certain the tram is faulty before you start. Then consider outside reports; question the driver about the defect, find out what he has done to rectify the fault - then draw your <u>own</u> conclusions.

Look for the simpler things first - blown fuse, tram isolated on dirty rails, etc. Use your eyes, ears and nose diligently to save time - you may find the trouble immediately.

You may have met apparently similar conditions before, but don't jump to conclusions - consider all the evidence first, before wasting time trying to fix a fault that isn't there.

COLLISIONS:

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When you arrive at the scene of a collision, note the positions of the vehicles involved and if necessary, draw a sketch.

Record the positions of the brake handle, controller handle, compressor and linebreaker switches. Note whether sand was applied and for what distance. If possible, also note the condition of the track.

A FIRE EXTINGUISHER MUST BE READY FOR USE AT ALL TIMES.

Provided there has been no injury or death and permission has been obtained from the Police, if in attendance, remove any motor vehicle or vehicles, observing precautions against fire. If Police are not in attendance, it may be necessary to show the "Authority to Clear Obstructions" card.

Don't give any information or opinion concerning an accident or collision to anyone other than an Officer of the Tramways Board.

Any tram which has been involved in a serious or fatal collision or in an "end-on" collision with another of the Board's vehicles must be removed from service as soon as possible and taken to the nearest depot. After an "end-on" collision, the Traffic Driver is not permitted to drive the tram; if a Traffic Officer is in attendance, the driver will be suspended, but in the absence of a Traffic Officer the Emergency Vehicle Charge Hand does <u>not</u> have the power to suspend the driver; however, the Charge Hand must not permit the driver to drive the tram and must use a member of the Emergency Crew instead. When the tram is berthed at the nearest depot, a "collision" board must be attached and the tram must not be driven,

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repaired or adjusted in any way until released by the Depot Foreman. In the event of an acute shortage of trams for service, instructions must be obtained from the Assistant Works Manager or the Inspecting Foreman.

Where vehicles are jammed together, separate them - in a "side-on" collision between trams or trams and motor vehicles, the quickest means of separating them often is to back both vehicles in the reverse direction to that prior to the collision - then, when the track is clear, remove any loose debris from the tram and stow it inside; loose material hanging from the tram must be securely lashed with new trolley ropes. Check the rail grooves at the scene of the collision and ensure that they are clear of all foreign matter. If necessary arrange to have debris cleaned from the roadway by the Civil Branch Emergency Vehicle Driver, Radio Car R9.

Remove any broken glass that could cause an injury and, if necessary, issue the person who is to drive the tram with a pair of cover-all goggles.

Determine whether the tram may be driven. If the controller has been displaced, check for damaged wiring and ensure that the earth wire is attached. Check the air brake and if it is inoperative because of broken pipes, test the handbrake. If neither brake operates, the tram must either be driven using the rear hand brake or it must be coupled to another tram, using a draw bar. Examine the tram for other damage, such as displacement of the truck bolsters or springs.

If the life gate is damaged and cannot be reset, use two 6 ft. steel bars from the Emergency Vehicle to lift the tray clear of the track and then tie it up securely with new trolley ropes. Sometimes it is possible, when the lifeguard trip gate rocking shaft is bent, to reset the lifeguard by pushing on the reset plunger and assisting with a pipe wrench on the rocker shaft. 的现在式产生大主义主义主义之父亲亲亲亲亲亲亲亲

If the lifeguard tray is badly damaged and the mounting brackets are bent, they may be straightened using the three-leg wire sling with another tram or the Emergency Vehicle as an anchor -(Figure I).

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Attach the two hooks to the outside edges of the tray rocking shaft and attach the rope fitted with the egg links to the draw bar attachment of another tram or of the Emergency Vehicle. Station a man at the rear of the disabled tram and drive the tram in reverse until the damaged tray is clear of the roadway then tie the tray to the motorman's steps using <u>new</u> trolley ropes.

When working without assistance, if the tray of a Class W3 to Class W7 tram is too badly damaged to tie up, it may be possible to remove the tray by removing the 5/8" bolts from the bottom ends of both adjustable tray brackets, removing the pin from the front of the connecting rod and unhooking the tension spring.

Before the tram is moved, the driver must be instructed that the lifeguard is damaged, that speed must be restricted to series speed only and that the gong must be used to warn approaching pedestrians. The tram must be removed from service at the nearest depot.

After a bad collision, check that the drop catches holding the destination boxes are not strained or displaced.

If the tram body is badly distorted sideways, ensure that there is sufficient space to clear other trams or motor vehicles; take care at all crossovers and curves and instruct the driver not to pass other trams on curves. If necessary, attach warning lights to the front and rear of the tram.

If it is necessary to push a tram, make sure the strengthened drawbar from the Emergency Vehicle is used.

All rules in "Instructions to Drivers in Electric Tram Operation" must be obeyed, with particular attention to rules governing rear end driving or pushing or towing of trams and the operation of automatic points.

Your responsibility ceases after a defective or damaged tram has been berthed in a depot and all information in your possession passed on to the Depot Foreman or, if after usual hours, entered in the Depot Log Book and the Depot Starter notified to attach a "defective tram" or a "collision" board.

The tram is then the Depot Foreman's responsibility and, in the case of a defective tram, he will ensure that the fault is traced and rectified. If the tram is required for traffic, the Depot Starter will notify South Melbourne Depot in accordance with the Traffic Code on defective trams berthed in a depot.

DERAILMENTS:

For all cases where all wheels of a tram are derailed, the metal parts of the tram could be alive and it is imperative that no contact be made between the tram and roadway or between trams by passengers, by-standers or crew. If the crew or any passengers are still on the tram, they must be warned to remain on board the tram until the trolley pole has been removed from the overhead wire and placed under the hook. If required, place warning lights on both ends of the tram.

There are almost as many different methods of re-railing a tram as there are derailments. No two cases are exactly alike and so each case must be treated on its merits. The Emergency Vehicle is equipped to deal with nearly every case which may arise. Familiarity with this equipment and its method of operation will assist you to restore services as rapidly as possible.

When you arrive at the scene of a derailment, try to sum up the situation as quickly as possible. Experience and knowledge of the equipment available will help you to select the most suit-able method of approach and the correct equipment first - different types of equipment scattered about the scene will hinder operations, since most of it will be unnecessary.

Derailments on Paved Tracks:

First clear the intersection or the main line. Then, if possible, try to re-rail the tram by driving. Should this not be possible because the trucks are twisted, two standard methods are available to straighten them.

Pyramid plates used as described on page 8, part II form the first standard method. However, if more than one or two "throws" of the plates would be required, the second standard method is preferred and comprises fitting the truck locking beam as described on page 2, Part II, jacking the tram, see page 6, Part II, swivelling the truck into alignment and lowering the tram.

Other methods are available and are chosen to suit the occasion if neither of the above is applicable.

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The Emergency Vehicle can be used directly by pulling with a chain or by using a rear wheel as a base for the German Jack. This method is fully described on page 14, Part II.

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The flat steel plate to which a steel angle has been welded, referred to as an "angle plate", is used as described on page 10, Part II to re-rail a tram which has been driven to the rails but will not re-rail because the wheel flanges have sunk in the soft track. The angle plate may generally be used to re-rail a tram which cannot be re-railed by driving provided the truck is not badly twisted.

After the de-railed wheels have been moved on to greased flat steel plates, the Emergency Vehicle may be used to align a truck by pulling with a chain; the method is suited to an open situation with light traffic flow and should not be used on a narrow roadway or where traffic is heavy. In such a case, use one of the methods utilising a German jack or the traction hoist.

When a broken axle has caused the derailment, it may be necessary to re-rail the tram without driving. The method is fully described on page 17, Part II and either uses the rear wheel of the Emergency Vehicle or a steel gad driven into the roadway as a base for the German jack which is then used to traverse the truck and align the wheel flanges with the rail grooves.

Releasing fouling trucks:

In many cases of de-railment, a truck may become fouled and an attempt must be made to release or relieve the fouling points. Any of the following five general cases may occur and may be treated on paved tracks as described:

- 1.
- Wheels may foul under the side sills. The corner of a No. 1 truck may foul against the pull rod bracket.
- Wheel flanges may short-circuit on the motor terminal block. 3.

. In any of these three cases, jack up the tram body to clear the fouling points then drive the tram off the jacks with the air brake released.

4. If the truck is off the side bearing plates, fouling may occur when an attempt is made to align the truck. Jack the tram body sufficiently high and place a piece of timber on the truck frame slightly higher than the side bearers to prevent fouling the ends of them.

of wood from the are released. man An on each rope. Drive the tram smartly with eased. As soon as the tram is driven off the dragged clear with the ropes so that the tram ing. After the tram has been re-railed, remove around remove the air jacks, t the station pieces they kept brake

5 roller may become jammed on or t roller may become jammed at the radius bar. First chock the whe beam " beam. Warn use and as soc will be impaired. As soc re-railment, at a place t traffic, re-adjust the tu normal position. the Driver that brake ef As soon as possible after a place that will not delay at the turnbuckle to its the st side pull 20 the rod

plates in position tram to clear the to re-align After a fouled truck has n the truck for driving position as described on jam. has to page 8, Pt. II before been freed, it may the rails. Place driving be 1 the necessary e pyramid the

Derailments on Open Ballast:

When a tram has been de-railed on open ballast, it is sometimes possible to re-rail it by driving either forward or in the reverse direction to special work, as frequently the wheels wil climb up special work on to the rails. It may also be possible to drive to a place where the track has been filled to rail height, such as at a road crossing, a conductor platform or the like where the tram may be re-railed more readily. Will

Failing these methods, which should be de-railed truck should be placed on greased flat a described on page 12, Pt.II. This will be possible cases of de-railment on open ballast tracks. They standard methods of aligning the wheels using a Ge Failing There steel plates e in the maine German jack. then majority t s three as the 20

The first method is the quickest set to push between the rail and the wooden described on page 16, Pt.II. Of course, where s collision, other methods must be employed. where sommers are damaged in a wooden or iron sommers and best. The jack is as

alongside the derailed truck and use the rear wheel of the as a base for pushing with the jack. Where this is not po a third method, used where the ground is firm, is to provi jacking base by driving steel gads into the ground. Thes are described fully on pages <u>17.Pt.II</u> and <u>19 Pt.II</u>. sel of the vehicle is not possible, s to provide a nd. These methods Vehicle

OF connected . OF page 14. Pt.II. wheels ct space O hold for to be the II f none of the above methods can be used be the vehicle or ground too soft to drive th regads, if there is a solid road close by re-aligned by pulling with the vehicle us the truck. A description of this method j because the using is given on the de-railed vehicle a chain OF lack OD

If other methods are impracticable a certain but "Tractel" hoist, as described on page 27.E.II. The main use hoists is after a derailment on an elevated track, such as derailed sideways and the tram body may lean at a bad angle bank. The hoist is then attached between a power pole and t le down the the the OF for arom be the tram railthese

depot. loose t In all cases of de-railment, whether on paved allast, examine the re-railed tram for damage before dr epot. Try to ascertain the cause of the de-railment and oose tyres or wheels, broken rails or other damage. aved track or driving it and check f OF for to open 0

When a tram splits the points, the leading truck will take one track and the trailing truck will tend to follow the other track. In an extreme case, one axle of one truck may split the points in a similar way. Frequently, a derailment follows; in any case, one truck will probably be twisted, sometimes quite badly.

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First try to clear the obstruction by driving. Drive in the reverse direction. Cut the first controller notch then cut quickly to the full series position. Repeat this two or three times if necessary.

If the trucks cannot be cleared by driving, check the wheels for jamming under the side sills. With No. 1 trucks, the end frame may be jammed against the brake pull rod guide. If the truck is jammed, use Simplex jacks under the body side sills and lift the body until the obstructions are clear of the truck. Tie a trolley rope around the jacks and station a man on each rope and drive the tram as detailed above. When the tram has been driven off the jacks, pull the jacks clear to avoid having to stop the tram to remove them. If the jam cannot be freed by jacking, it may be possible to push or pull with another tram. If the trams are too far out of line to use the tow bar to pull with, use a chain connected to both motor eyes or to truck frames. Driving must then be carried out with both drivers working in unison, instructed by the Charge Hand.

On occasions, the trucks may be so twisted that the brake pull rod, truck frame or a wheel flange short-circuits the motor terminal block. If the motor leads are badly damaged, it may be necessary to cut them to allow the tram to be driven on three motors. If this is necessary, cut the leads on the motor side of the terminal block, at the fibre cleat.

As with a derailment, inspect the car for damage before driving to the nearest Depot. Try to ascertain the reason for splitting the points and check for loose tires, wheels, axles and for the presence of any foreign body in the track work or for defective trackwork.

TRAM OFF END OF OPEN BALLAST TRACK:

When a tram has run off the end of open ballast track, drive it back to the rails, if possible. It may be necessary to build up a temporary track to the end of the rails, using the steel surfaced wooden beams, wood blocks or sleepers, if available, then drive the tram to the rails. If the truck is not aligned with the rails, build the temporary track at lease one truck length back past the beginning of the rails then treat the incident as a normal derailment.

TRAM DERAILED, UNABLE TO BE DRIVEN:

Where a tram is derailed but for some reason cannot be driven, tow it, using the usual methods for turning trucks where necessary, with the added precaution of placing greased angle irons in the rail groove as the time of delay will be greatly extended if it becomes necessary to reverse the direction of tow during the procedure.

LOOSE TIRES OR WHEELS, DAMAGED FLANGES & BROKEN AXLES:

Delays may be caused by loose tires or wheels, damaged flanges or broken axles.

If the three unaffected wheels are in position in the rail grooves, the tram is not regarded as being derailed and in peak conditions or other busy traffic a reasonable risk may be taken if the fourth wheel cannot be rerailed, and the tram may be driven slowly to the depot.

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Particular care must be taken over special track work and if necessary, a false check rail may be formed by laying a series of greased angle irons in the rail groove. If the tram is at or near a terminus, however, it should be left at the terminus, placed on false trucks and driven to the Depot after the peak has ended.

For almost all cases of broken axles, it will be nec-essary to place the tram on false trucks. The procedure for this is fully described in Part II of this Code, on Page 20.

If the axle has broken at the inner side of the wheel boss of a leading wheel and the wheel has not collapsed sideways, a justifiable risk may be taken to clear an intersection, crossover or busy narrow roadway by first removing the brushes from the motor concerned and then driving the tram, no further than is absolutely necessary, taking particular care on special work. When clear, the tram must be placed on false trucks.

When a trailing axle is broken on the outer side of the wheel boss and, on a No. 1 truck, the truck equalizer beam or on a No. 9 or 15 truck, the spring or axle box is resting on the roadway, the tram may be driven with care to the nearest terminus or Depot. At a terminus, the defective truck must be placed on false trucks.

Where a derailment has occurred with the broken axle, whether on open or ballast track, rerail the tram by the normal methods and then place the defective truck on false trucks for transport to the Depot. Depot.

If an axle has broken and the motor nose has become dislodged from the floating rubber suspension, first place the motor lifting beam in position as described in Part II, Page 2. but do not tighten the lifting hook nuts immediately. Instead, place a German jack with a wood block under the base at the top of the lifting beam in line with the front of the motor eye. Pass a steel strop or chain through the motor eye and over the foot of the jack, lift the motor clear of the roadway and then tighten the lifting beam nuts. This should hold the motor up, allowing the German jack to be released and removed. Place the false trucks under the defective truck but before lowering the tram, place packing pieces on top of the false trucks spacing bars to support the motor; then lower the tram onto the false trucks.

When a tram is fouling an intersection or crossover and cannot be driven because the leading axle has broken at the inside of a wheel boss, allowing the motor case to fall and jam on the roadway, the motor may be lifted clear by the following method: Lift the trap-door above the broken axle, remove the brushes from the motor concerned, then pass a chain or wire strop around the motor suspension bearing housing and axle. Place the trap door over the floor opening at right angles to its normal position then set a German jack on top of the trap door with the chain or wire strop over the foot. After lifting the motor clear of the roadway, the tram can be driven clear and, if on straight track, to a more suitable site for placing on false trucks.

MOTOR VEHICLES BLOCKING TRACKS:

Provided there has been no injury or death and, if Police are in attendance, permission has been obtained from the Officer in Charge, the Charge Hand must attempt to clear the obstruction immed-iately and not wait for the Eus Crane or a Tow Truck. If Police are not in attendance, it may be necessary to show the "Authority to Clear

If the danger of fire exists, all fire precautions must be taken in accordance with Part III of this Code.

Check to ensure that the ignition of the motor vehicle concerned is turned off.

It is usually possible to right a capsized motor car or light delivery van by manhandling, using the crew of the Emergency Vehicle and, if necessary, the tram crews. When righted, the vehicle may be pushed or towed clear of the track.

If a motor vehicle is just fouling the track and cannot be driven or pushed clear because of mechanical damage, it may be possible to bounce or rock it clear.

The quickest method of clearing a heavy vehicle which has The quickest method of clearing a heavy vehicle which has overturned is to drag it clear of the track using a heavy chain attached to the Emergency Vehicle. If this method is not practicable, attach a heavy chain or steel cable to the truck chassis and pass it under, around and over the body. Attach the other end to the tow hook on the Emergency Vehicle which is then used to roll the capsized vehicle back on its wheels. If the capsized vehicle is top heavy, an anchor rope must be attached to it and a bight taken around the base of an overhead pole. As the vehicle is pulled upright, a man stationed at the pole slackens or tightens the anchor rope as re-quired to prevent the vehicle from rolling over on to the opposite quired to prevent the vehicle from rolling over on to the opposite side.

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If the vehicle's load has shifted and presents a safety hazard, it must be unloaded.

If a direct pull cannot be obtained to right the vehicle, an indirect pull may be obtained by using a wire rope through a snatch block attached to an overhead pole. Use a 60 ft length of 2 inch circumference wire rope.

CAUTION: WHEN USING CHAINS OR WIRE ROPES, BYSTANDERS MUST BE KEPT CLEAR OF OPERATIONS.

A quick method of moving a disabled heavy vehicle which is just fouling the track is to lift each wheel, place flat greased plates under the wheels and drag it clear with the Emergency Vehicle, using a chain attached to the disabled vehicle.

TRAM BOLSTER OUT OF POSITION:

A collision or bad derailment sometimes will displace the tram bolster, leaving the body leaning at an angle to the trucks.

- There are three general cases of such bolster displacement: (1)Bolster displaced sideways and, on occasions, caught under the truck frame.
- (2)Bolster springs displaced.
- (3)Bolster on top of truck or motor.

Generally, a reasonable risk should be taken and the tram driven slowly to the terminus where the bolster can be repositioned. The tram driver must be warned not to drive around any curve where the body lean is towards the other track until instructed by the Charge Hand, who will hold up tram traffic while the defective tram clears the curve.

When the tram has been moved to a suitable position, the following methods may be applied to restore the bolster to its correct position:

- (1)Where the bolster is out of alignment sideways, it may be replaced by using the traversing jacks as described in the Method, Part II, Page 22
- (2)Displaced elliptic springs in a No. 1 truck often can be sprung back into position with a 6 ft. bar after jacking the body.

In the case of the bolster resting on top of the truck In the case of the bolster resting on top of the truck or a motor, chock the wheels of the unaffected truck and lift the body until the bolster is clear of the truck; then lever them forward until bolster and truck are correctly aligned, traversing the body sideways also if necessary. Chock the wheels and lower the body into position. On occasions, the brakes will grab and prevent the truck from being levered forwards: in this case. the truck from being levered forwards; in this case, lower the bolster again and release the brake cylinder beam turnbuckle and proceed as above. In this case, the tram driver must be warned that braking efficiency will be impaired and the turnbuckle must be readjusted as soon as possible at a place where traffic will not be impeded.

LOCKED WHEELS:

Several abnormal conditions can cause one or more pairs of wheels to lock. If the cause can be quickly recognized and rectified, less delay will result than if the tram is pushed; if the cause cannot be determined and rectified, it will be necessary to off load the passengers, isolate the affected motor and drive or, if necessary drive and much the the necessary if necessary, drive and push to the nearest shunt.

When endeavouring to free the locked wheels, first check which wheels are locked by driving the tram.

The following possible causes should then be considered :-

Bruised wheel flanges. Deep flanged shoes fouling on a wheel having a flange or other defect. Climbing brake rigging. Tight brakes. Hand brake not released. Broken gear teeth. Defective air brake equipment. Displaced armature coils caused by broken bands. Internal short circuit in a motor. Collapsed roller bearing. On Class W2 trams, intermediate hand brake lever jammed on bolts holding saloon floor boards at trap door steel frame.

All wheels locked:

Place the air brake handle in the release position and see that the brake cylinder sleeve and the hand brake are in the released position.

If the brake cylinder sleeve is not released, apply the hand brake and take the brake valve handle to the opposite end and release the air brake. Return to the driving end, release the hand brake and if the tram moves freely, drive it to the nearest depot, using the hand brake to stop. The condition may occur at a terminus or when shunting at a crossover and the fault is usually a jammed double check valve or a jammed exhaust valve in the motorman's valve.

If the wheels are held by tight brake adjustment or a mechanically defective brake cylinder, chock both sides of a pair of wheels and release the brake cylinder beam turnbuckle or the shoe adjusting points on the trucks. Even if the air brake is inoperative, leave the compressor switch "on" and check that sand is available for emergency braking. The tram driver must be informed that braking will be impaired and that speed must be kept within the capability of the braking available. Return the brakes to normal as soon as possible without holding up traffic. If the wheels of a W2 Class tram are locked because the intermediate hand brake lever is jammed, apply the air brake fully and use a 6 ft. heel bar lever from outside the tram to force the lever clear of the floor bolts or the steel splash guards on the truck. This condition is cause by driving around a curve with the hand brake at the opposite end partly applied. The tram should be changed over for inspection of the wire rope as soon as is convenient.

One Pair of Wheels Locked:

Reverse the trolley poles, take the air handle and the reverse key to the other end of the tram and after ensuring that the track is clear, cut the first controller notch to close the linebreaker then move the handle smartly to the full series notch. Try this procedure two or three times. If it is not successful, check for tight brake adjustment. Chock both sides of a pair of wheels and release No. 9 or No. 15 brake shoes at the adjusting points on the truck; on a No. 1 truck, release the brake cylinder beam turnbuckle. Remove the wheel chocks and again attempt to drive in reverse. If the tram drives freely, run it to the nearest depot; otherwise remove the brushes from the motor on the affected axle and drive to the nearest depot, siding or terminus with the locked wheels skidding. If the motor has been badly overheated, do not open the motor inspection lid to remove the brushes as a fire may result; instead, cut out the pair of motors involved at the controller.

When driving with one pair of wheels locked, do not attempt to improve traction of the other wheels by applying sand. If the tram will not drive with the available motors, drive and push with a following tram which may use sand if necessary. When taken to a terminus or siding with the wheels still locked, the tram must be placed on false trucks and left there with an Emergency Crew member or other employee of the Board, if available, as caretaker until peak loading is over and traffic conditions permit it to be moved to the Depot on the false trucks. When the tram is being transported on false trucks, as with slackened brakes, the Driver must be warned that braking efficiency has been reduced and he must travel at reduced speed accordingly. The compressor switch must be left "on" and a check made to ensure that sand is available for emergency braking.

TRUCK DEFECTS:

The following are truck defects which may be encountered during emergency operations. The procedures described have been devised to clear the delay as quickly as possible and to allow the tram to be brought back to the depot for inspection and, where necessary, repairs.

1. Outside brake shoes climbing the wheels and locking on No. 9 or 15 trucks: In this case the end frame of the truck will be lifted clear of the axle box spring. Drive the car in the reverse direction of travel prior to the defect by cutting the first controller notch to close the line breaker, then moving the controller handle smartly to the full series position. If this is not successful, repeat the procedure several times. If this still does not free the wheels, release the adjusting point for the pair of shoes concerned. This should allow the shoes and truck to return to their normal position, after which the shoes must be readjusted. Check the wheels for damage and change the car over as soon as possible for further inspection.

2. Broken brake pull rod: When a brake pull rod breaks, braking is operative on one truck only. The tram can be driven to the depot but the driver must be instructed that the braking is reduced to half and to keep tram speed within the capabilities of the brakes. Before driving, check that the compressor is switched on and that sand gear is operating. On a very steep down grade, a following tram should be coupled with a draw bar to assist with the braking.

3. Broken brake cylinder beam or anchor bracket: A tram with a broken brake cylinder beam or anchor bracket will have no air or hand brakes; the only braking available will be the fourth emergency electrical brake. Chock the wheels until a draw bar is attached to another tram, then push or tow the defective tram to the nearest depot observing all traffic rules for pushing or towing of trams.

4. No. 1 truck equalizer bars broken: Either one or both equalizer bars of the pair may break.

- (a) When one bar and its bolts are broken and the bar When one bar and its boilds allo broken and the bar fouls the roadway, lift it clear of the roadway and the it securely to the truck frame with a trolley rope. If the broken bolt cannot be removed, secure it so that it will not foul the spokes or holes in the wheel.
- (b) If both equalizer bars are broken, remove the equalizer spring and lift the corner of the truck frame with a 3 ton hydraulic jack with suitable wood packing under its base. Place wood packing between the top of the axle box and truck frame. This procedure will have taken most of the load off the equalizer beam which may then be lifted clear of the roadway with 6 ft. steel bars and lashed securely to the truck frame. The jack may then be removed.

In both cases, the tram may be driven to the nearest depot and changed over, particular care being taken over all special work.

5. No.15 truck semi-elliptic axle box spring broken: Lift the end of the truck frame with a jack under the spring seat and place suitable wood packing between the top of the axle box and the truck side frame. Remove or tie securely the loose spring leaves, lower the jack and drive the tram to the nearest depot to be changed over, taking particular care over special work.

6. Brake adjusting turnbuckle or brake gear becoming detached and fouling roadway: Braking efficiency will be impaired. The the defective part clear of the roadway and arrange to change the tram over, warning the driver of the reduced braking and ensuring that the compressor is switched on and that the sanding gear is operative for emergency braking.

7. Motor nose suspension stirrup or bolt broken: The tram may be safely driven if the motor concerned is cut out. The tram must be changed over at the nearest depot.

8. Motor pinion loose on shaft: Cut out the motor concerned and change the tram over at the nearest depot.

9. <u>Truck spring plank damaged and fouling the roadway</u>: The lease delay is incurred by using a German jack placed on top of the body bolster with a wood packing piece under its base and placing a chain or wire strop under the detached end of the spring plank and over the foot of the jack, then jacking the plank clear of the roadway. The bolster springs must be either removed or secured by means of a trolley rope. The car may then be driven with care to the nearest depot terminus The car may then be driven with care to the nearest depot, terminus or siding, the driver being warned not to drive around curves where the body lean is towards the other track until instructed by the Charge Hand who will hold up tram traffic until the defective tram is clear of the curve.

On arrival at a terminus or siding, the damaged truck must be placed on false trucks.

After the tram has been cleared, the track must be inspected for some distance back for faults which may have caused the damage, paying particular attention to loose or misplaced drain or point box

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10. Thrust collar fallen off and either missing or jammed under the tram: If the thrust collar is missing, ensure that the back half of the suspension bearing is not misplaced and arrange to change the tram over at the nearest depot. Inspect the track for the missing parts of the collar.

When the thrust collar is jammed under a motor, part of the truck gear or a lifeguard, try reversing the direction of travel to free it. If this is not successful, jack the tram; it may only be necessary to lift one wheel to remove the collar.

11. Broken gear teeth or a collapsed motor roller bearing: These defects usually result in one pair of wheels locking, the procedure for which is described fully on Pages 10&11. During peak or busy traffic conditions, remove the brushes from the motor concerned and drive to the nearest depot or terminus. If a leading axle has locked, it may be necessary to push with the following tram. On no account may sand be used.

If taken to a terminus, place the tram on false trucks for return to the depot after the peak.

12. Motor nose suspension casting or beam broken, allowing motor to drop and foul roadway: When a motor nose suspension has failed and the motor has dropped, the lifting beam is used to lift the motor clear and allow the tram to be driven back to the depot. Lift the motor hatches and place the beam in position, attaching one lifting hook to the outside eye of the unaffected motor and the other lifting hook to the inside eye of the defective motor; the beam is placed over the hooks with the outside hook through the usual slotted hole and the other hook through a matching square hole. Tighten the outside hook and then lift the nose of the fallen motor by screwing up the inside beam hook. When the motor is lifted clear of the roadway, secure it with wooden wedges placed between the nose of the motor and the truck transom. Slacken the beam nuts slightly but leave the beam in position as a precaution against the wedges falling out.

13. Hot Bearings: NOTE: At all times before opening up any hot bearing, place a fire extinguisher close at hand.

- (a) Axle Box: Don't remove the cover. Drive to the nearest depot or terminus. If at a terminus, remove the cover, remove the remains of the wool packing, repack with new wool, fill with oil, replace the cover and change the tram over at the nearest depot.
- (b) <u>Armature</u>: Don't open the bearing lid. Remove the brushes from the defective motor and drive to the nearest depot or terminus. If at a terminus, offload the passengers, open the lid, withdraw the remains of the wool packing, repack with new wool, fill the oil well to the top with oil and change the tram over at the nearest depot.
- (c) <u>Suspension</u>: Don't open the bearing lid. Drive to the nearest depot or terminus. If the wheels lock, remove the brushes from the defective motor. At a terminus, off-load the passengers and check for the cause of heating; if the thrust collar has insufficient end clearance, remove the collar and fill the oil well with oil; if the suspension bearing is faulty, slacken the housing bolts, withdraw the burnt wool packing, repack with new wool and fill the oil well with oil.

In all cases of hot bearings, the tram <u>must</u> be changed over at the nearest depot.

14. Excessive vibration on a tram fitted with resilient wheels: Check all wheels for collapsed rubber sandwiches or broken bolts and change the tram over at the nearest depot for further inspection.