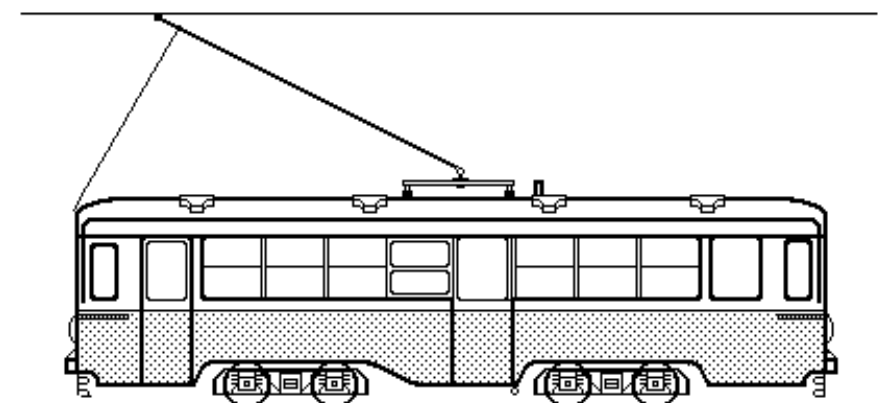


SYDNEY TRAMWAY MUSEUM

NAGASAKI ELECTRIC TRAMWAYS 1050 CLASS TRAMCAR

Instruction Manual for Car No.1054



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NAGASAKI ELECTRIC TRAMWAYS 1050 CLASS TRAMCAR INSTRUCTION BOOK FOR No.1054

01 GENERALLY

The Nagasaki Electric Tramways (NET) car No.1054 is a bogie vehicle with direct power control and manual lapping air brakes, but it is equipped with a number of auxiliary devices and controls which are sufficiently non-standard to warrant special consideration when compared with the other Museum fleet cars.

Therefore, to avoid damage to the tram, members are directed not to attempt to drive the car until they have undergone essential tuition.

02 THE TRAM

Originally Sendai Tramways No.121, No.1054 was rebuilt for one-man operation on the "pay-as-you-leave" principle before being obtained by NET who converted it from 3' 6" to 4' 82" gauge.

It is a double-ended two-motor bogie saloon car with front and centre egress, protected by electro-pneumatically operated sliding doors.

The tram is fitted with manual lapping valve operated service air brakes, while emergency/supplemental braking of the controlled dynamic form is provided through the power controller.

In NET service the No.1 End of the tram was indicated as the "A" End, the No.2 End being the "B" End.

03 CURRENT COLLECTOR

A pantograph type sliding bow device originally collected power, but until the museum tramway overhead wiring is adjusted and the pantograph collector is increased in height, the pantograph has been replaced by a single standard trolley pole.

Revised instructions will be issued in due course on pantograph operation. Until that time the collector raising and lowering controls are out of use.

Special rope hooks are provided at each end of the tram to secure the trolley rope when the tram is in operation. There are no roof hooks to secure the pole when the tram is out of use.

04 ELECTRICAL SAFETY

The tram has an all-steel body. Therefore, should it run onto non-conducting rails or be badly derailed, all metal parts on the tram should be considered "live" until the trolley pole is removed from the overhead wire.

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05 POWER CONTROL

The tram is driven by means of a Mitsubishi combination power/dynamic brake controller. This has 4 Series and 4 Parallel power notches for normal acceleration, with a mechanical stop at Full Parallel.

There is no stop block for OFF since the controller can be rotated anticlockwise from OFF towards 7 braking notches. Some latitude is available between the first power notch and the first braking notch, but the controller handle must be in the OFF position before the reverser handle can be removed.

A motor cutout switch is fitted on the back of each controller. The reverser handle is used to rotate the switch fully in the required direction. The numbers "1" and "2" are moulded into the back of the controller case to indicate which motor is cut out. A defective motor must be cut out from whichever power controller is in use.

Operation into the parallel and braking notches IS NOT available with one motor cut out.

06 DYNAMIC AND EMERGENCY BRAKING

The tram is fitted with a regulated dynamic brake that is brought into operation by working the power/dynamic brake controller anti-clockwise from OFF through the 7 braking notches. This is done in stages, notch-by-notch, until sufficient braking effect is obtained. The reverser must remain set for the direction the tram is moving during operation of this brake. The dynamic brake may be eased as necessary.

If, in an emergency situation, the tram begins to roll away backwards, the reverser handle must be operated to the "Reverse" position for the dynamic brake to function.

Second and Third Emergency braking procedures are also available.

It should be noted, however, that the effect of the dynamic brake and the Third (Electrical) Emergency brake are lost when the tram speed reduces to about 7 km/h (walking pace).

An emergency brake valve is provided in the passenger saloon operated by a pull cord located under a hinged cover to the left of the left hand side centre door.

To operate, open the cover and pull the handle out as far as it will go. The air brake will apply to the Full Emergency position and a bell will ring continuously in the driver's cabin.

To reset the emergency brake valve, lift the passenger seat to the left of this door and swing the valve handle to the left (anti-clockwise) as far as it will go and until all air escape is stopped and the warning bell ceases.

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Apply the driver's air valve to full emergency, then to full release to restore the braking function.

07 SERVICE BRAKE

The tram wheel brakes are controlled through a manual lapping brake valve that has been adjusted to work in the normal "Sydney" manner, i.e. "**RELEASE**" is **ANTI-CLOCKWISE** and "**APPLY**" is **CLOCKWISE**. (When delivered the brake valves functioned in the opposite direction.)

A duplex air gauge is provided, pressure being noted in metric units, the working range being marked by a red arc.

08 PARKING BRAKE

There is no parking brake provided on the tram. Other means must be used to secure the tram when the air system is exhausted or the tram is left away from the immediate control of the driver, except when it is parked on level track.

To this end, special timber chocks are provided on the tram, one in each driving compartment, carried in a special bracket.

The chocks **MUST** be returned to their respective holders after use and **WILL NOT** normally **BE REMOVED** from the tram for use elsewhere.

09 BOGIES

The tram is fitted with equal wheel bogies with normal bogie centres but each bogie is fitted with only one 40 hp motor, outside hung and attached to the inner axle. When lightly loaded, the tram has a strong tendency to slip.

There is no mechanical provision for sanding the rails. If the tram cannot be restarted on wet or greasy rails on an upgrade then it must be stopped, and sand, ashes or other like material be spread along the railheads ahead of the tram wheels. Power must be applied before the air brake is slowly eased. Once the tram has commenced rolling, full speed must be allowed to develop on first notch before attempting to accelerate further.

10 LIFEGUARDS AND COUPLING BAR

The tram is not fitted with operating lifeguards. The light steel rod fenders at each end should be treated with respect and the tram not be allowed to run into obstructions.

Brackets on the inner side of the A End fender are designed to carry a removable coupling bar. This must be restored to the brackets when not in use. Coupling pockets and pins are provided on the buffer beam at each end of the tram.

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11 AUXILIARY POWER CHANGEOVER SWITCH

An auxiliary power changeover switch is provided in the B End control cubicle "K", being the right hand switch accessible through a cut out in the cubicle door.

Turned to the right, the control power is directed to the auxiliaries switches above; turned to the left, the control is directed to the other end of the tram; turned to vertical (Neutral), all auxiliary power is isolated. *This switch MUST be returned to Neutral when the tram is stabled to prevent discharge of the auxiliaries supply batteries.*

When operating this switch, the driver will note that the sliding door controls will be altered and the external rear view mirrors may operate.

Care is to be taken to ensure that passenger safety is not endangered through the operation of this switch and that sufficient clearance exists for the proper operation of the rear view mirrors.

12 PUBLIC ADDRESS SYSTEM CHANGEOVER SWITCH

A public address changeover switch is also provided in the B End control cubicle "K", being the left hand switch accessible through a cut out in the cubicle door. It is presently out of use and will generally be left in the central (Neutral) position.

13 MOTOR GENERATOR SET/BATTERIES

Control power at 24 volts is provided through a motor/generator set under the car floor that is in circuit with 2 x 12 volt automotive type batteries located under a seat in the passenger saloon.

Failure of the M/G set to operate will require the tram to be returned to the tram shed immediately for changeover. Failure of the battery supply is of nuisance value only but must be reported at the end of an operating shift. Failure of both these sources of power may render the tram inoperable.

14 COMMUNICATION SIGNALS

The tram is fitted with a single stroke electric communication bell with a repeater lamp on each driving end console. Bell pushes are located on various window pillars each side of the car.

While any door is open the bell will sound whenever a bell push is operated. Once all doors are closed the signal circuit is reset and the bell will sound once only and the repeater lamp will glow when a bell push is operated. To reset the circuit operate any door switch briefly.

When the tram reaches a compulsory stop, the Conductor will not be required to give a "proceed" signal if none of the doors are opened. If such a signal is

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attempted, the Driver must briefly operate a door switch to reset the circuit before proceeding.

15 DOORS

The tram is fitted with electro-pneumatically operated sliding doors, all of which must be closed before the tram can be powered in normal operation.

Controls at each driving end operate (from the left) the front left, centre left and centre right doors, respectively.

When changing ends, the driver is directed to operate a control changeover switch. This will override the door controls and may close the doors on the right hand side and open those on the left, depending upon the position of the door control switches. Drivers should take this into account when changing ends to avoid trapping boarding or alighting passengers in closing doors.

The "door open" function is also related to the available control circuit power. If the trolley pole is removed from the overhead wire or the traction power fails and the auxiliary batteries are badly discharged then any open door will close. The doors will re-open when traction power is restored to the tram.

When in NET service the tram was run on "centre entrance/front exit" principles. For this, an electric beam sensor is fitted across the bottom step at each centre door. When this is obstructed the door will not close. Failure of the sensor beam lamp will also prevent an open centre door from closing if the door switch is operated to the "Close" position. A red lamp on the driving end console will glow/flicker as the electric beam is interrupted.

When the tram is stabled without air pressure, a sliding door may be opened by hand to gain access to the tram.

Door isolating cocks are provided in the tram for each door. Those in the driver's cabin on the floor to the left of the power controller operate the nearest end door. Those accessible from the saloon, under the passenger seats, operate the nearby centre door.

It is recommended that when the tram is being stabled in the tram shed all door switches be moved to the closed position and the door isolating cock at the end of the tram facing the shed door be opened, the tram door being manually opened, and closed after the tram is properly stabled.

Outside the shed, the door at the end facing Cross Street should be so operated.

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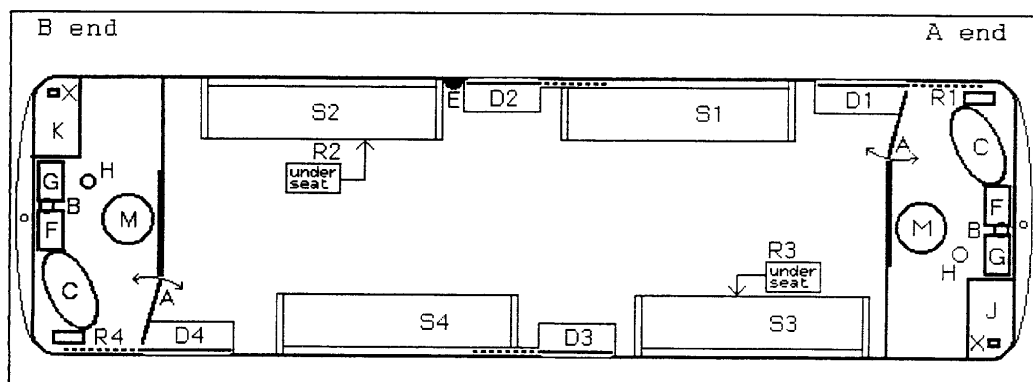


Fig. 1.

GENERAL EQUIPMENT LAYOUT (Fig. 1)

A: Driver's door - opens out (*to be kept latched while the tram is in operation*).

B: Manual lapping air brake valve

C: Traction power and dynamic brake controller.

D1, D2, D3, D4:
Sliding door and step well.

E: Passenger/Conductor operated emergency brake control.

F: Switch console "F".

G: Switch console "G".

H: Horn foot pedal.

J: Control cubicle at A End.

K: Control cubicle at B End.

M: Driver's seat.

R1, R2, R3, R4:
Door release cock.

S1, S2, S3, S4:
Passenger seat (some equipment under as indicated below).

S1: Magnet valves - attention by maintenance staff only.

S2: Emergency brake reset under seat, right hand end.

S3: 2 x 12 volt batteries; isolating switches.

S4: Air intake; compressor governor; pantograph isolating cocks and magnet valves.

X: Switch (out of use).

16 DOOR/LINE SWITCH INTERLOCK CIRCUIT

There is a switch provided on each door, in the line switch circuit, to prevent the tram being powered with any door open. Traction power is also switched off if any door is opened while the tram is moving. The dynamic brake *is not* automatically applied under these circumstances.

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In the event that a failure occurs which necessitates the tram being driven with any door opened, then a door circuit by-pass switch is provided which is to be closed. Special care must then be taken when operating the tram in passenger service with a defective door. The respective door operating switches can still operate non-defective doors.

17 AIR HORNS

In place of the normal warning gong the tram is fitted with air horns. Depressing a foot punch in the driver's cabin floor operates each.

Drivers are to use these devices sparingly while travelling through the Museum grounds and only for normal warning and signal purposes on the main line.

In the event that an air horn control fails and the horn continues to sound, an isolating cock under the floor adjacent to the air horn must be closed and the tram worked back to the depot with care.

18 WINDSCREEN WIPERS

Two wipers are provided on the driver's windscreen. The larger unit is to clear the window for normal vision.

A smaller wiper is provided in the top corner of the screen to enable the external rear view mirror to be seen.

19 PUBLIC ADDRESS SYSTEM

The tram is fitted with a tape operated public address system. This has been placed out of use and crews are not permitted to attempt to operate this device.

20 DESTINATION INDICATORS

A roller blind device is fitted into the roof above the driver's window at each end. This is internally illuminated and also fitted with internal coloured glass slides. The slides are to be kept adjusted to show a white light until further notice.

A route number board frame is provided on the left hand side of the end aprons (viewed from outside the car) and spare number boards are stowed in a rack against the driver's cabin bulkhead.

A route description board frame is provided on the right hand side of the end aprons and special route/reference boards may be provided for use in these frames.

21 CAR LIGHTS - GENERALLY

Car lights are controlled through various switches as detailed on the diagrams and as outlined below. The saloon main lights, the end marker lights and the destination box lights are operated from the 600V DC supply.

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The remaining lights are connected to the 24V DC auxiliary supply and should be switched off when not in use to avoid unnecessary power drain on the battery supply.

Saloon Main Lights, Marker Lights and Destination Box Lights: these are high voltage and are controlled through a bulkhead switch which changes the direction of the marker lights and reverses the polarity of the fluorescent saloon lights to reduce tube blackening.

Headlights: these are low voltage type and are controlled through a bulkhead switch and over-ride switch K31.

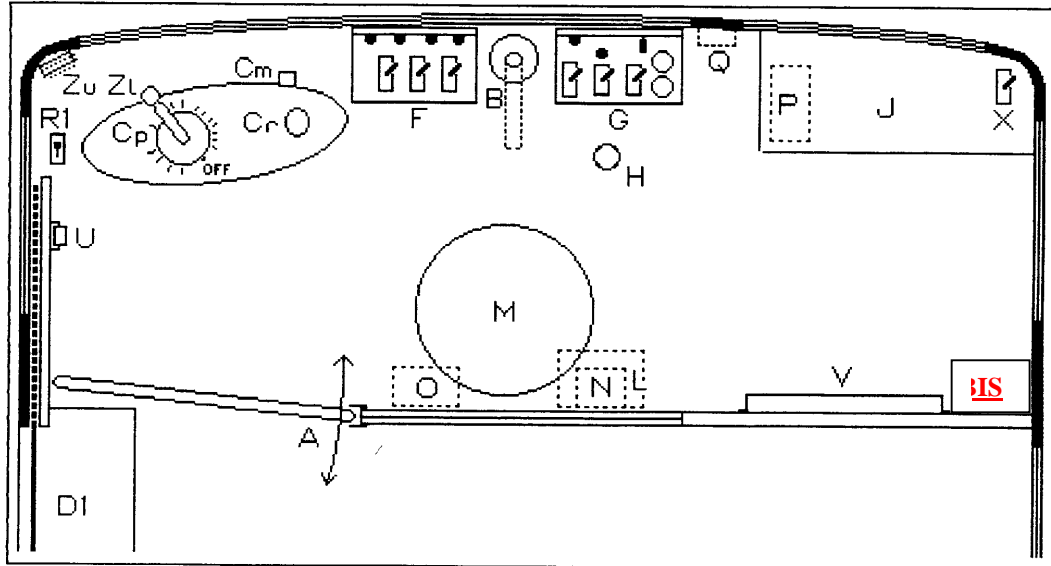


Fig. 2

DRIVING CAB LAYOUT A (Fig. 2)

- A: Driver's door - to be kept latched while the tram is in operation.
- B: Manual lapping air brake valve, removable handle.
- Cm: Motor cutout switch on back of controller.
- Cp: Power/brake handle.
- Cr: Reverser.
- D1: Sliding door in step well (A End).
- F: Switch console - see Fig. 4, page 10.
- G: Switch console - see Fig. 4, page 10.
- H: Air horn foot pedal.
- J: Control cubicle - see Fig. 5, page 10.
- K: Control cubicle - see Fig. 6, page 11.
- L: Marker, Saloon and Destination box lights changeover switch, on bulkhead over (Centre - OFF; Down for A End; Up for B End).
- M: Driver's seat.

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N: Spare fuses box.

O: Headlight Changeover Switch (Centre - OFF; Down for A End; Up for B End).

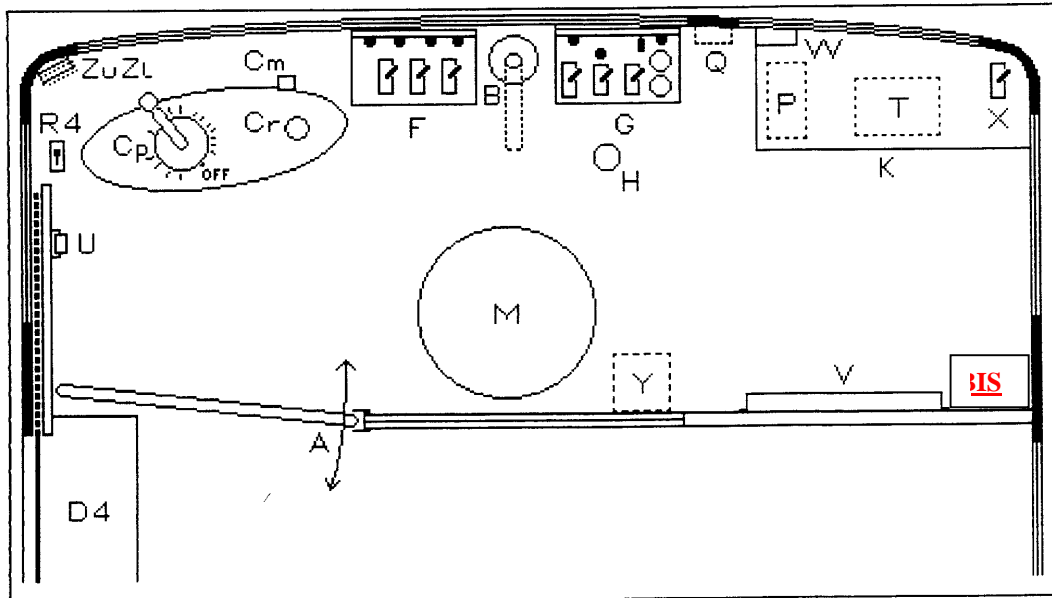


Fig. 3

: Air brake system duplex gauge.

R1: Release cock for door D1.

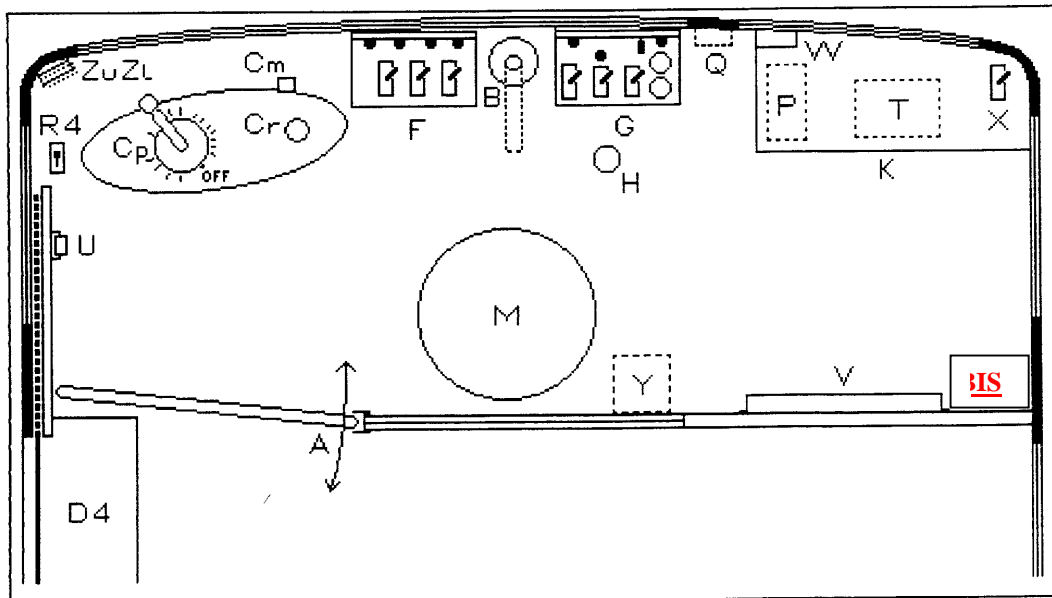


Fig. 3

BIS – Battery Isolating Switches

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DRIVING CAB LAYOUT B END

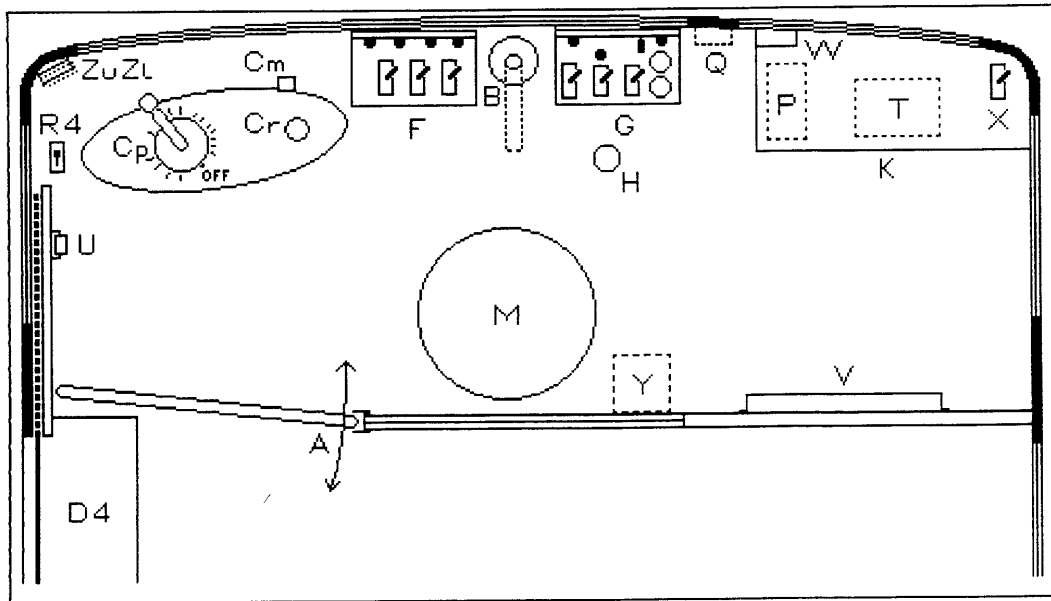


Fig. 3

R4: Release cock for door D4.

T: Public address system tape deck: not in use.

U: Chock; chock holder.

V: Route number board storage rack.

W: Motor/Generator output meter.

X: Switch - out of use.

Y: Cassette rack.

Zl: Conductor/Passenger communication bell - sounds a single stroke the first time a saloon bell push is depressed. Reset by opening any door.

Zu: Emergency air brake warning bell - sounds continuously until emergency brake is reset.

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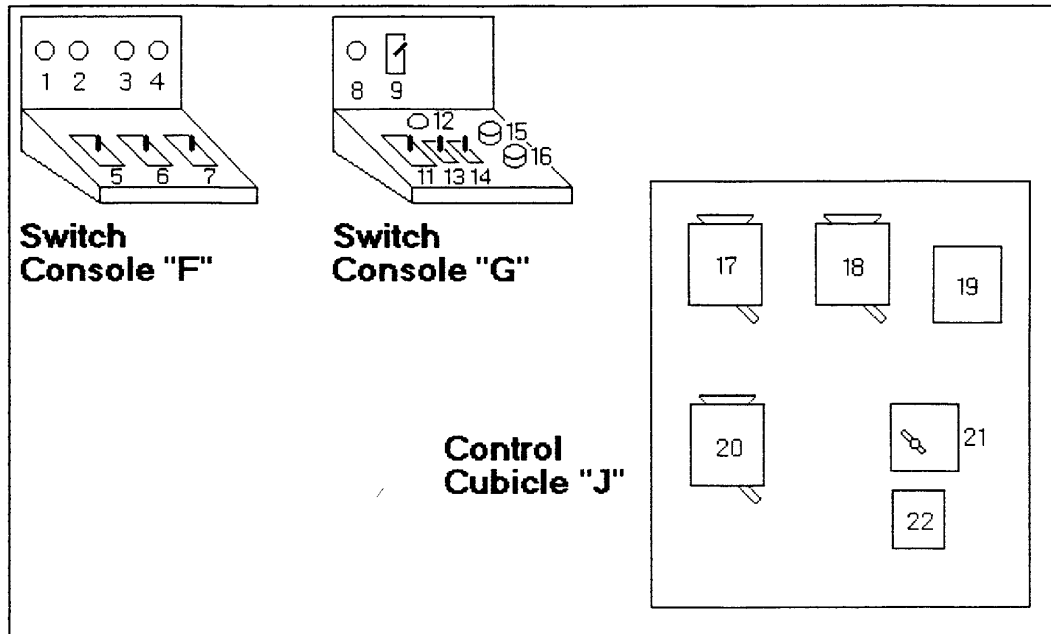


Fig. 4

AUXILIARY CONTROLS LAYOUT (Fig. 4)

- 1: Lamp: lights when communication bell push is operated.
- 2: Lamp: glows when auxiliaries' power is switched to this end.
- 3: Lamp: lights when all doors are closed.
- 4: Lamp: flashes when doorstep electric light beam is interrupted.
- 5: FRONT DOOR switch.
- 6: CENTRE LEFT DOOR switch.
- 7: Mirror Isolating Switch - will cause mirror to retract or remain retracted when in the OFF position.
- 8: Lamp: glows to indicate when line switch closes and traction power is ON.
- 9: Line Switch (Line breaker) control.
- 10: Lamp: glows when motor-generator is functioning.
- 11: CENTRE RIGHT DOOR switch.
- 12: Lamp: flashes when motor-generator is not functioning and sufficient battery power is available (usually in the event of the trolley pole leaving the wire or running onto a dead section).
- 13: Switch for supplementary windscreen wiper for outside mirror view.
- 14: Switch for main windscreen wiper.

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- 15: Push button: depress to unlatch pantograph - out of use.
- 16: Push button: depress to lower pantograph - out of use.
- 17: 600V Saloon Lights main switch.
- 18: 600V Destination and Marker Lights main switch.
- 19: Fuse (out of use).
- 20: Compressor switch.

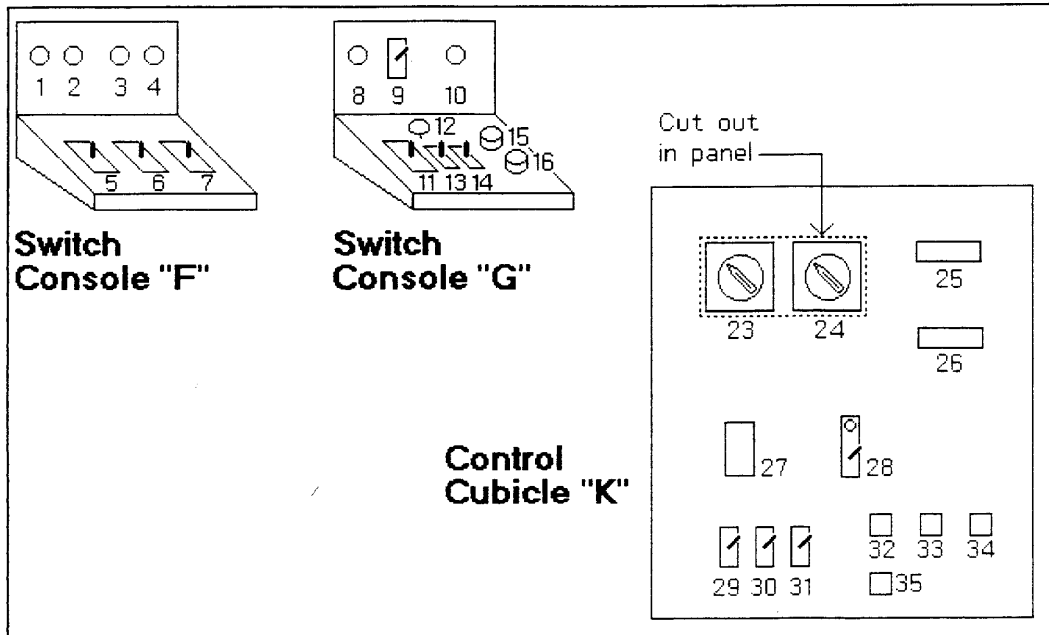


Fig. 5.

- 21: Motor-generator isolating switch.
- 22: Control resistor.
- 23: Changeover switch: Out of use.
- 24: Auxiliaries changeover switch: Left - A End; Centre - OFF; Right - B End; Centre - OFF. Check doors and rear view mirrors before operating this switch.
- 25: fuse
- 26: fuse
- 27: diode panel
- 28: Door circuit bypass switch - to be closed only in an emergency to operate tram with one or more doors open.
- 29: Saloon emergency lights switch. Lights will come on if this switch is closed and tram loses traction power. Lights will extinguish when traction power is restored.

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- 30: Courtesy lights switch. Door well light and under car pavement lights will come on if this switch is closed and either centre door is open.
- 31: Headlight master switch.
- 32: relay
- 33: relay
- 34: relay
- 35: relay

Door Courtesy Lights: these are low voltage type controlled through door mounted limit switches and through override switch K30.

Saloon Emergency Lights: these are low voltage type and are controlled through the lost traction power solenoid operating. They glow when the main saloon lights are extinguished through loss of traction power. They are isolated, if required, through the override switch K29.

Control Panel Lights are generally operated through the equipment that they indicate. They may, in some cases, be extinguished by the operation of the control and auxiliary changeover switches.

22 PREPARING TRAM FOR TRAFFIC

Check that the coupling bar is firmly seated on the brackets behind the A End fender.

Examine the tram for possible clearance problems with rear view mirrors. Enter the car through the "released" door and ensure the necessary external rear view mirrors are isolated.

Place trolley pole on the overhead wire, ensure compressor and motor/generator are operating. Close/operate any control switches necessary to drive the tram. Close "released" door air cock.

23 STABLING TRAM

When stabling No.1054 in the tram shed, and having observed the special instructions mentioned elsewhere, the driver will close all doors and windows, operate the door release cock on the front left hand door for the tram facing the shed doors and open this door manually.

Open all switches so designated, leave the car and manually close the door. Remove trolley pole from the overhead wire.

Ensure that the Battery Isolating Switches have been turned off. See figure 3 above for the location and the photo for the item.

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When stabling the tram outside the shed and not under direct supervision of a driver, place one of the special chocks under the outer wheel on the down hill end of the tram, close all doors, operate the door release cock on the front left hand door for the tram facing the expected direction when next it is moved, exit from tram by manually operating the released door. Remove trolley pole from the overhead wire if tram is to be left for a long period and set the auxiliaries' changeover switch to the neutral (centre) position.

24 CHANGING ENDS

Because, on the museum tramway between Railway Square and Waratah Loop, passenger movement through the tram egress doors mainly takes place on the western side of the tram, when the tram arrives at Waratah Loop the Driver will not operate the auxiliaries changeover switch when changing ends. The Conductor will operate this switch immediately prior to giving the proceed signal.

On reaching Railway Square, the Conductor will once again operate this switch to open both doors on the western side of the tram. At intermediate stops on the inbound trip, the Driver may operate the centre door only on the western side using the additional door control switch provided for "off-side" operations or both doors on the eastern side in normal operation.

When the tram is operating on the Park extension, on reaching The Royal National Park the Conductor will operate this switch and, if necessary, the door switches to open both doors on the western side of the tram.

If the tram is operated in the normal manner with the doors closed, then it will not be necessary for the Conductor to give the "proceed" signal unless the doors are opened after any stop. The bell system is locked out of use after the first sound until one door is momentarily switched towards "Open".

25 AVAILABILITY FOR SERVICE

NET No.1054 is only available to be driven by authorised members, specifically trained in the operation of the tram. Although rebuilt for "one man" operation the tram must always carry a crew of two to satisfy the safety requirements of the RSA and the DOT accreditation, until further notice.