COLOUR LIGHT SIGNALLING

As Used On Single-line Sections Of The Brisbane Tramway System

By Robert Thomson

Tramways, in common with railways, require some effective means of control when operating under single line conditions. Whatever system is adopted, be it mechanically or manually operated, it must be efficient in its operation thus avoiding any undue delays, but in achieving this, ensuring maximum safety at all times.

With the later arrival of street tramways on the transport scene, it was only natural for well proven railway practices to be adapted for tramway operation, though on a modified scale. This being applicable in the field of safety controls for single line operation.

One such system, that pertaining to staff operation has been used by some tramway authorities in this country. This system of control allows no vehicle to occupy a single line section without the possession of some tangible object, such as a staff or tablet which are kept in a secured instrument receptacle, situated at the opposite ends of each section.

A strong feature of this system is that it requires the running staff to participate in its operation and it also gives the motorman tangible evidence of his right to that particular section of single line. Its disadvantage requires the car to be halted in order to deposit or receive the staff and this relay is further accentuated in tramway operation as most sections of single line are not of any great length. Consequently this calls for a repetition of this time consuming operation after, literally speaking, a matter of minutes.

However with the installation of trolley operated signals, this time factor is eliminated for a motorman is able to determine, without having to leave his car, whether or not he has the right to occupy the approaching single line track.

The signals are operated by the current collector of the tram, in this case the trolley wheel, coming in contact with an overhead switch. These switches are attached to each trolley wire and are located at the entry to and exit from each block. It is this passage of the trolley wheel which forms an electrical contact thus causing the switch to open or close.

The mechanism of the signal can be divided into three distinct parts:

(i) the indicators or coloured lights;

(ii) the intermediate representing the relay, through which the impulses of current, caused by the passage of the trolley wheel, can be converted into signals on the indicator;

(iii) the actuating consisting of the overhead contact switches which determine the indicators, regulated by the trolley wheel.

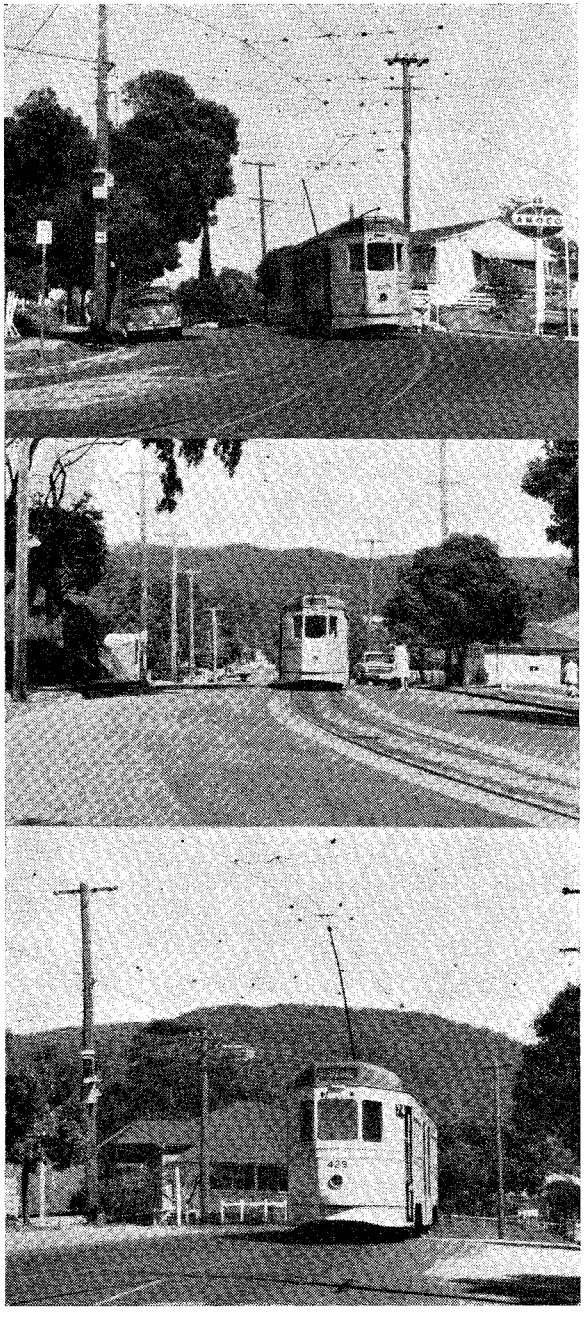
The switch itself, consists of a light angle-iron frame to which are attached two contact strips insulated from the trolley wire, this being terminated at each end of the frame. However the contact strips are so arranged as to allow the uninterrupted passage of the trolley wheel.

One strip is connected to the electrical current while the other is earthed by way of the relay. The trolley wheel, being made of copper, bridges the contacts and thus actuates the signal whether the car is consuming current or not. In addition to the trolley wire, a signal wire, supported on the adjacent spanpoles, connects in series, the indicators at the other end of the block.

The motorman of a tram approaching a block will know that his car will have sole occupancy of this section if no lights are shown on the indicator. On proceeding, the trolley wheel passes under the switch and a green light is registered on the indicator at the point of entry. Simultaneously a red warning light is cut in at the opposite end of the block.

These terminal indicators comprise a large oblong metal box with two shielded indicator lights, one green the other red, positioned near the top of the box. As with all signals, these boxes are so positioned to be easily discernible by motormen.

In the event of a motorman proceeding past a terminal stop light, a second danger signal is positioned in a prominent location approximately midway in the block. This single aspect signal is actuated by trams proceeding from the opposite direction. Located at the exit to each block is a single aspect green signal which



is also linked in series with the other signals previously mentioned. The purpose of this signal is to indicate that once the tram leaves the block the signals are also cleared from the indicators. If however this green light remains on after the passage of the wheel under the switch, it conveys that a following car has also entered the block.

A following car may occupy the block before the first car has cleared the signals at the other end. A green light indicates that there is at least one other car ahead, travelling in the same direction. With the entry of each car into the block, its passage is registered on the signal relay and so the signals remain until such time as the number of cars entering a block have also cleared that particular section.

This system is well suited for sections of single line with crossing loops at each end. However where no such facilities are provided at the terminus a problem arises in that a tram on arriving there cuts out all lights in that block thus indicating the terminus has been reached. The system of signalling as described above is also applicable to this section with the exception of the overhead switches which at the terminus end of the block are located a short distance from the standing road.

However with the signals cleared from this block there is no indication to the motorman of a following car, on arriving at the loop, if another tram is standing at the terminus. To overcome this blind spot, a second indicator is positioned immediately above the line aspect colour light signal, at the terminus end of the loop. This second indicator is in the form of an illuminated sign displaying "Tram at Term". A tram, on proceeding to the terminus, switches on this sign which remains illuminated until such time as the same number of cars travelling to the terminus have arrived back at the loop.

1. A car from Bardon nears the end of the single track section. The signal protecting the section is on the spanpole at left.

2. A car stops near a curve and the intermediate passing loop on the Bardon line. The signal on the spanpole at left is additional to those at each end of the single line section.

3. A car leaves the intermediate loop on the Bardon line for the terminus. The signals on the spanpole include the "Tram at Term" signal.

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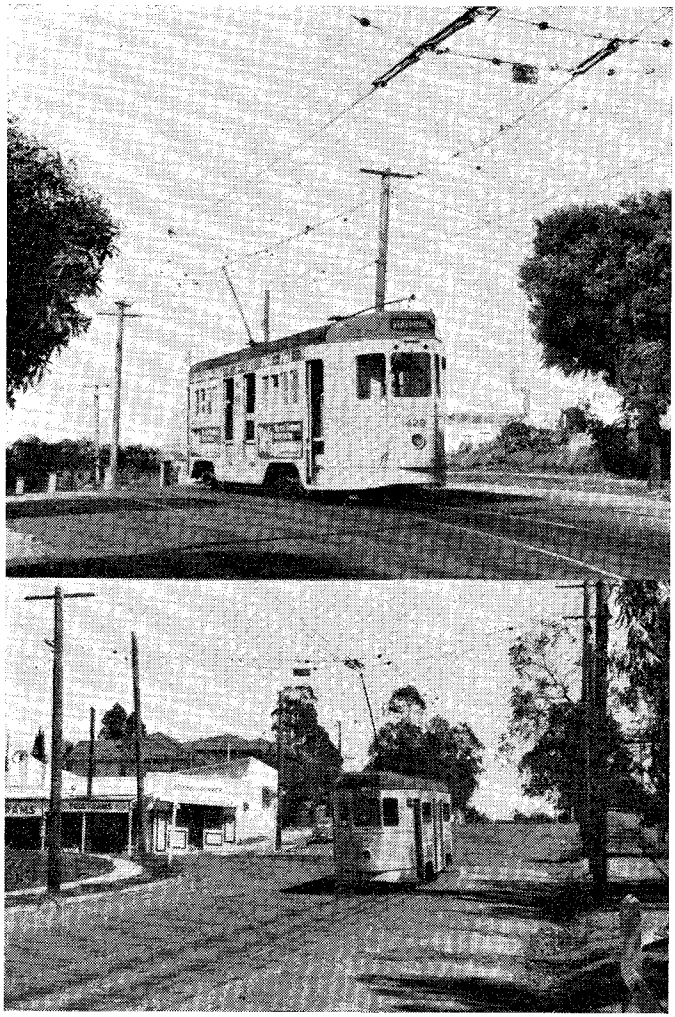

(Above): A car stands at the intermediate loop on the Bardon line waiting the arrival of a city bound car before proceeding to the terminus. The signal contactors are clearly visible on the trolley wire.

(Below): A car approaches the end of the Bardon line, passing under the signal contactors that control the "Tram at Term" signal.

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Therefore if no red light is burning, following cars on arrival at the loop may proceed to the terminus to complete the journey providing the timetable does not require the same order of departure as of arrival.

Having thus briefly described the workings of colour light signalling on the Brisbane tramways, the reasons for its introduction will be explained.

Single line working has always been a feature of tramway operation in Brisbane. Prior to January 1st, 1923, the tramways were owned and operated by the Brisbane Tramways Company Limited. It was this company that was responsible for constructing the lines that today form the nucleus of the system. Without exception these pioneer lines were constructed with at least one section of single track. Wherever it was possible the crossing loops were so positioned as to allow for single line working either by timetable or by visual operation.

The Ipswich Road tramway was perhaps the most striking example of this type of construction. The section of Ipswich Road from the Woolloongabba Fiveways to the present Juliette St. crossover is relatively straight although some slight curves are encountered. Crossing loops were positioned at these blind spots and in all four crossing loops were interspersed in 56 chains of single line.

With the refusal of the then State Government to extend the Company's franchise, very little in the way of capital improvements were expended on the system. Therefore when the Brisbane Tramway Trust took possession of the undertaking, it inherited a very run down system suffering from the lack of maintenance in all aspects.

In relation to trackwork many sections of single line were duplicated but when it came to constructing new lines, the Trust was forced through limited funds to revert to single line construction with the provision of crossing loops where necessary. However allowance was made for eventual duplication by laying the single line, usually the inbound (up) track, off-centre. This pattern of constructing new extensions was continued by the Brisbane City Council into whose control the system passed on December 1st, 1925. By 1940, of the twenty-two suburban routes in operation, only two were completely double tracked.

During its short period of control, the Trust had initiated a progressive policy of tramway modernisation. It was this policy which encouraged experimenting with new ideas and was to become a feature of tramway operation in Brisbane. It is only in recent times that this practice has been discouraged in relation to tramway operation.

Towards the latter half of 1924, preparations were in hand for the installation of two elevated signal cabins at the busy junctions in Petrie Bight. This work also involved the installation of electrically operated two aspect colour light signalling, operated in conjunction with the hydraulically operated points.

With this work in hand it was decided to install colour light signalling on the long section of single track on the outer section of the (now abandoned) Greenslopes line. This is the first mention of colour light signalling made in the Trust's weekly reports and it must be assumed that its introduction to Brisbane would be concurrent with the installation of signal boxes.

By 1943 no less than twenty-six sections of single line were protected in this way. In the immediate post war years with the increase in motor traffic it became desirable to duplicate sections of single line which were located in busy arterial roads. Accordingly duplications were carried out on six routes and where the line was extended the duplication was undertaken in conjunction with these new works.

With the route closures of 1955 and 1962, the number of sections of single line now protected by colour light signalling has declined to thirteen. The only recent additions being the installation of signals on the O'Keefe St. depot-working line in 1961 and in 1964 the positioning of a "tram at term" sign at the Ashgrove terminus.

Human nature being what it is tends to take for granted those things with which we come into contact in everyday life. The tram traveller's prime interest is in reaching his destination on time and little or no thought is given to the complexities of operating a transport undertaking. The passenger may only pass a cursory glance at the small, inconspicuous, signal apparatus, but it stands as mute evidence of the part played in keeping the wheels of the tramway system in motion.

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