Bus Priority

Objectives

To increase the demand of public transport, because buses normally carry more people than other vehicles in relation to their use of road space – efficiency of the transport system

Types of bus priorities

- With-flow bus lanes: lanes reserved for buses travelling in the same direction as the normal flow
- Contra flow bus lanes: lane reserved for buses travelling in the contra direction as that of the normal flow
- Reserved bus lanes on freeways (sometimes reversible for tidal-flow operation)
- Priority access to freeway and other facilities (e.g. toll road)
- Bus only street
- Busways
- Priority at traffic signals
- Traffic regulation
- Comprehensive schemes

Effects of bus priority schemes

- Economic
  - Changes in walking, waiting and riding times of bus passengers and other road users who are granted the same privileges
  - Change in travel times of non-priority vehicles – negative impact for non-priority vehicles
  - Change in walking times of pedestrians affected by the scheme, not necessarily bus passengers (e.g. reduced delays to pedestrians in bus-only streets)
  - Changes in bus operating costs, which may affect fares or subsidies
  - Change in operating costs of other vehicles – negative
  - Change in consumer surplus
  - Change in the number of accidents

Effects of bus priority schemes

- Social and political
  - Redistribution effects – redistribution of costs and benefits between different sections of the community, e.g. between:
    - car owners and non-car owners
    - the better-off and the poor,
    - various age groups.
  - Effect on modal split – changes in the flows of the different classes of traffic, e.g.: buses, cars, taxis and goods vehicles
  - Fuel conservation – changes in the total amount of fuel consumed
  - Amenity – changes in the number and types of pedestrian journeys within specific areas, e.g. bus-only streets
  - Acceptability – changes in attitudes towards the bus route
  - Second-round impacts such as change in job, educational, social opportunities

Effects of bus priority schemes

- Environmental
  - Changes in atmospheric pollution
  - Changes in noise levels
  - Changes in the visual scene

Evaluations

- Economic
  - Time savings and losses
    - Time: walking, waiting and riding
    - Change from one mode to another
  - Resource cost gains and losses
    - Changes in operating costs of buses and other vehicles
    - Changes in the number of crews employed
    - Actual costs of implementing bus priority schemes

Evaluations

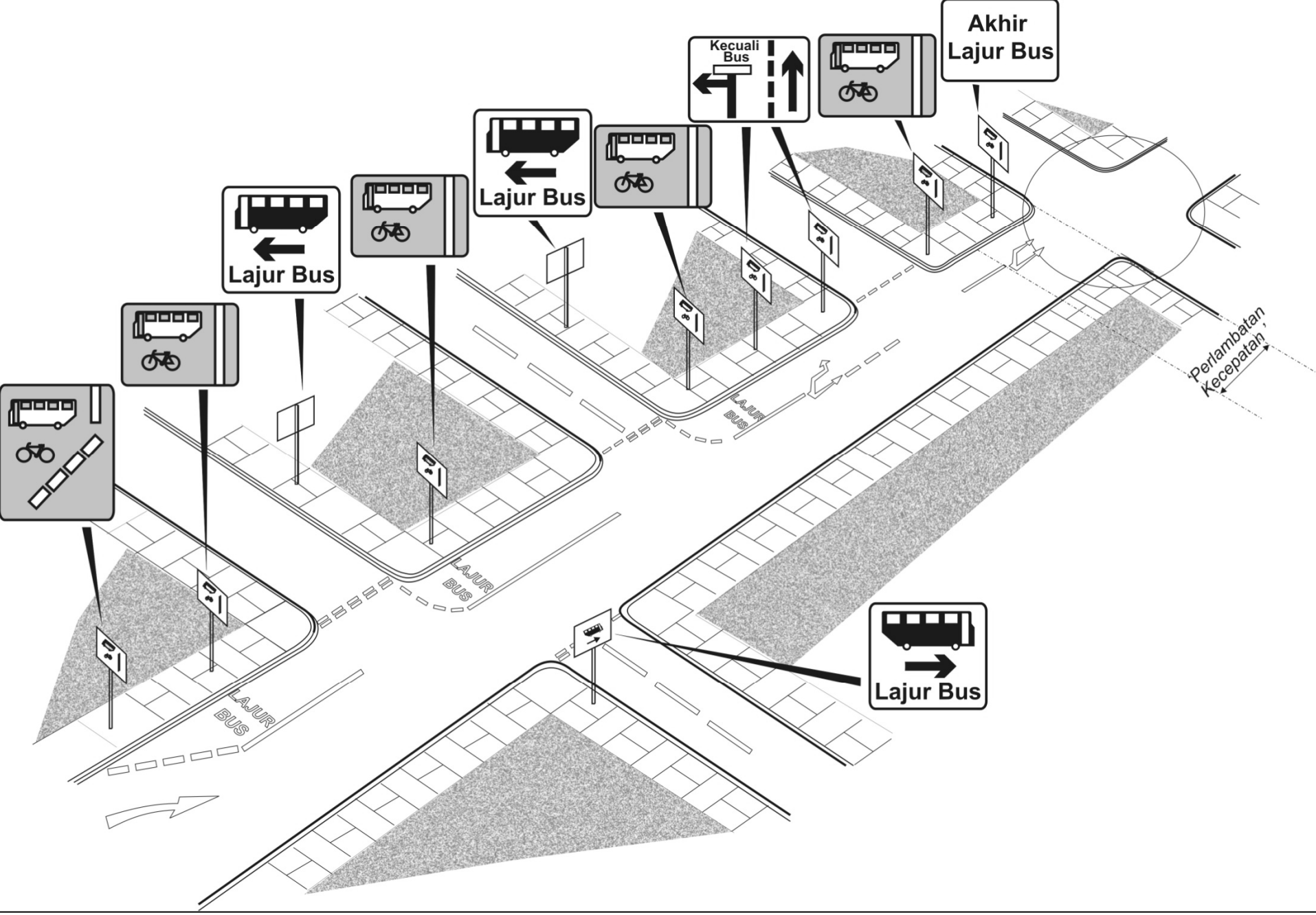
- Social and Political
  - Which section of community pay the costs and which reap the benefits
  - Ability of certain groups of people to make trips
- Environmental costs

  For traveller and residents of the area, e.g. noise and pollution

With flow bus lanes

Traffic lanes reserved for bus use where the buses continue to operate in the same direction as the normal flow.

The reserved lane selected is normally the kerb lane.



With Flow Bus Lane

With-flow bus lanes

Advantages

As queue jumping devices,

- Reducing trip time
- Greater reliability

Disadvantages

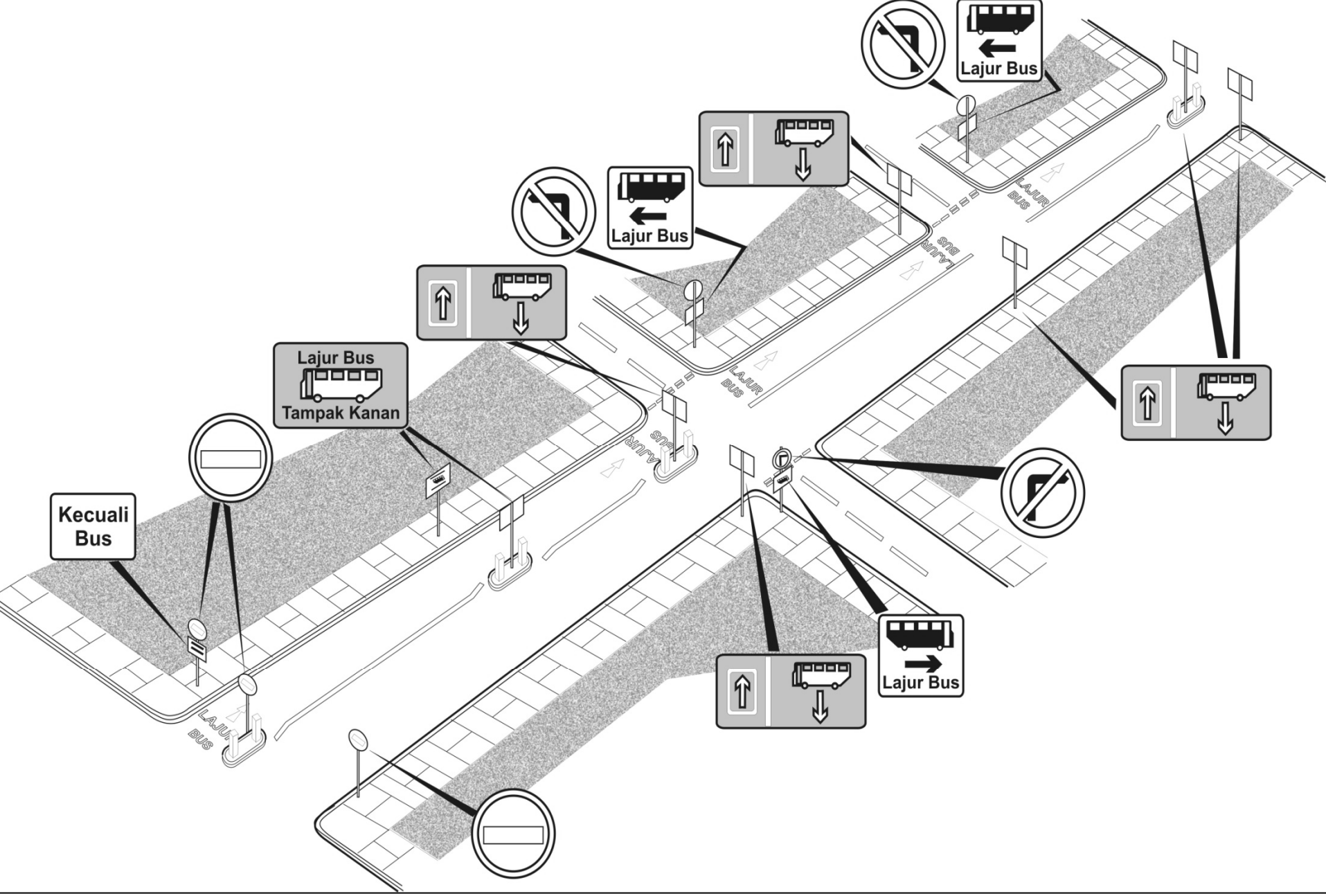
- More trip time for private vehicles
- For kerbside reserved lanes: they require continual and vigorous enforcement, since non-priority vehicles will be attracted to the kerb lane and may stop or park
- For median reserved lanes; bus passengers are required to cross lane
- It needs reinforcements: road marking, road signs, police reinforcement

Contra-flow bus lanes

Traffic lanes reserved for buses travelling in the opposite direction to the normal traffic flow.

Installed in one-way streets, using the kerb lane.

They may be divided from the general traffic lanes by continuous white lines (single or double) or, more rarely, by a continuous physical separator.



Contra Flow Bus Lane

Contra-flow bus lanes

- Advantage: reduce delay
- Disadvantages:
  - Pedestrians may be unaware of buses running in the opposite direction to the normal one-way traffic
  - Need some modification of junction layout
  - More conflict points
  - Problem of loading or unloading of delivery vehicles

Freeway (Toll road) priority

Bus priority along freeway:

1. Separated roadways
2. With-flow bus lane
3. Contra-flow bus lane

Priority Access to Freeways/Toll roads

- Exclusive ramps
- Priority at toll gate
- Priority at toll barriers

Delay usually occurs at entrance ramp, toll gate or toll barriers.

Priority Access to Freeways

Exclusive ramps provide direct entry into the freeway system. It could be:

- One of the existing ramps may be closed to all traffic except buses
- New ramp may be constructed

Priority at toll gate

Queue usually occurs at toll gate.

Exclusive gate can be provided for buses

Priority Access to Freeways

- Priority at toll barriers

Bridges, tunnels and hilly road tend to become very congested during peak periods, because provision of the capacity necessary to enable the facility to run freely is generally too expensive.

An exclusive toll entrance may be provided for buses`

Bus only streets

Bus only street is one which is restricted to the use of pedestrians, public transport and, perhaps, limited classes of other traffic such as bicycle, taxis, emergency vehicles and vehicles requiring access to premises in the street.

Objectives of Bus only streets

- To help people reach the more popular destination in a town by public transport without walking more than, say, 200 metres
- To improve bus reliability and reduce delays to passengers
- To improve interchange facilities between different bus services by providing a more attractive environment in which this activity takes place
- To seek safety standards for pedestrians as near as possible to those of pedestrian areas,
- To improve mobility of pedestrians in shopping and other areas attractive to them
- To improve the environment of shopping streets and other streets used intensively by pedestrians by removing unnecessary traffic and so reduce adverse traffic effects (noise, fumes and visual intrusion) to more acceptable levels
- To protect and improve the commercial use of the area

Full pedestrianisation or bus only streets ?

Full pedestrianisation

- Complete elimination of traffic, more attractive and comfortable for pedestrian
- More walking distance to the shopping area

Bus only streets

- Bus passengers can be taken to the very heart of the shopping centre
- If several bus services are brought together in bus only streets, interchange between different bus services becomes more efficient and pleasant, since it carried out in an area where bus passengers can enjoy the amenities (visiting restaurants, shops or kiosks) during the time available between buses

Consideration for selecting bus only streets

- Bus services are suffering from a significant amount of traffic-induced unreliability and delay
- Bus access to the areas of high pedestrian activity is poor (possibly as a result of the implementation of one-way street schemes)
- There is conflict between traffic and pedestrian as evidenced by:
  - A high pedestrian accident record
  - Long pedestrian delays in crossing the road; and/or
  - Excess levels of traffic – included pollution (noise, smoke and carbon monoxide)
- It is feasible to prevent large flows of traffic from diverting into, and adversely affecting, surrounding residential or amenity areas
- It is possible to provide satisfactory access arrangements for local residents and for servicing commercial premises
- The scheme would be compatible with other short-term schemes for the area (but not necessarily with long-term scheme)
- Implementation of the scheme presents few practical problems and will be free from controversy

Busways

Fully segregated roadways for exclusive bus use to a succession of connecting bus lanes.

A separate bus way can be integrated into the design of a residential area in such a way that access to public transport is much easier than in areas where bus services must operate on normal roads.

Priority at Traffic Signals

- Adjustment of cycle time
- Phase splitting
- Bus priority in area traffic control schemes
- Gating

Adjustment of cycle time

When buses pass through signal-controlled intersections, the delay may be quite long even though there is no traffic queue, since some buses will have to wait for the full red time.

If signal cycle times are generally long, the effect of the delays at several intersections may be seriously detrimental, in that the variable journey times may cause consecutive buses to bunch, so that the ervice becomes irregular.

Solution: to provide short cycle times, where possible, at intersections carrying an appreciable flow of buses.

If a cycle time is so short that the capacity becomes insufficient to pass all the traffic arriving at the junction, however, the delays to all traffic, including buses, will rise rapidly.

Phase splitting

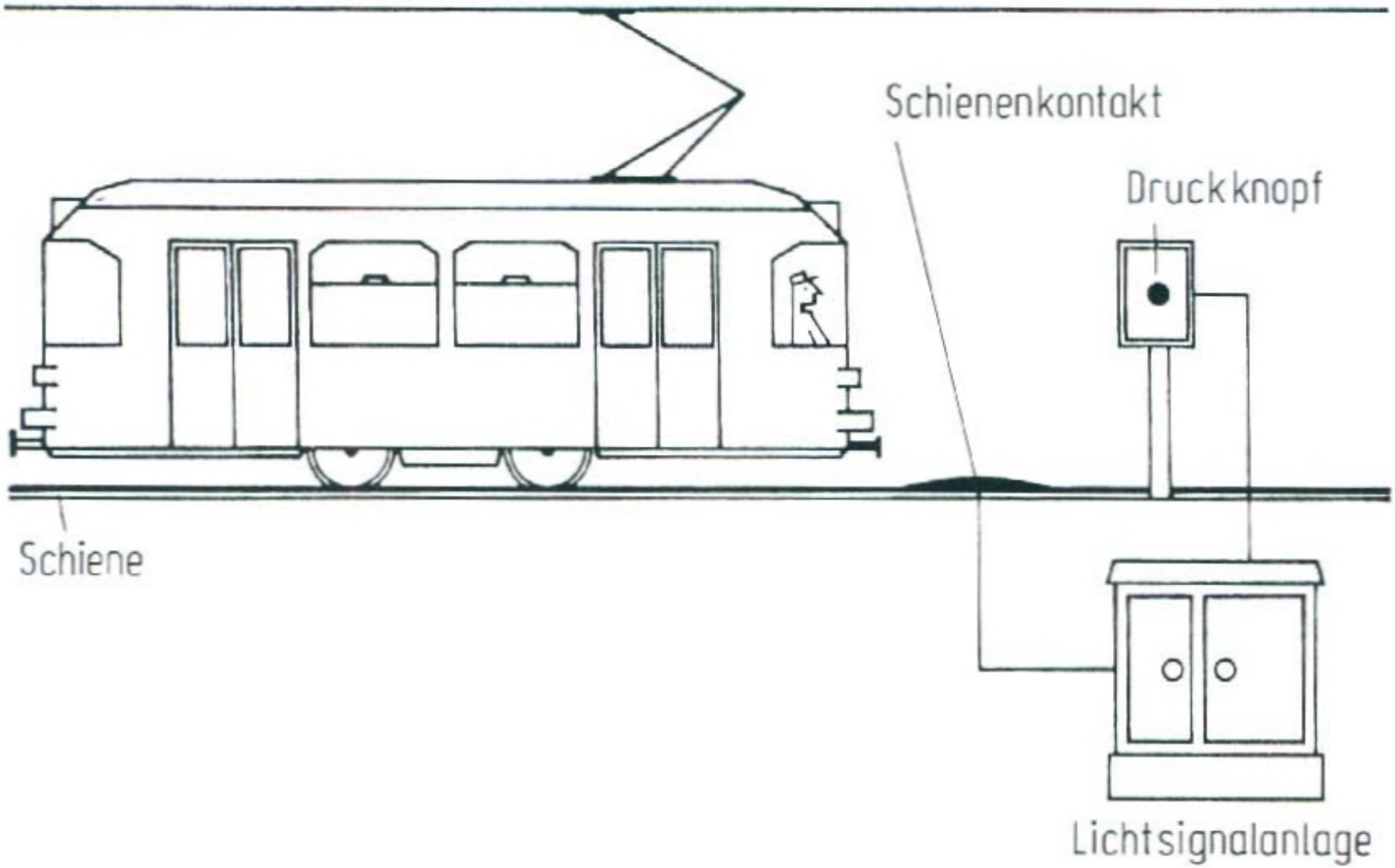
- Where the traffic signals have only one phase during which bus traffic flows, but at least two phases with no bus traffic, is to split the bus green period into two.

- If the green period containing the bus flow is split into two short green periods separated by two phases for non bus traffic, the maximum delay to buses can be almost halved, and their bunching reduced. The cost is negligible and the total capacity of the junction is only slightly reduced.

Bus priority in area traffic control schemes

To reduce delays and to improve traffic flow, it has become common practice to coordinate on a fixed time basis the timings of signals at adjacent junctions. In consequence, off-line computer optimisation methods have been developed, the more well-known being: COMBINATION, TRANSYT, SIGOP, SCOOTS and SCATS.

This allows the various components of bus journey time to be separately considered – free running time between intersections, stopped time at bus stops and queueing time on the approaches to signal-controlled intersections.


Schienenkontakt
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Area Traffic Control System (ATCS)

- Transyt (U.K.)
- SCOOT = Split Cycle and Offset Optimising Technique (U.K.)
- SIGOP = Traffic Signal Optimization Program (U.S.)
- SCATS = Sydney Coordinated Adaptive Traffic System (Australia)

SCATS (AUSTRALIA)

It has been implemented in Australia, New Zealand, China, Singapore, Hongkong, Malaysia, Philippines, USA, Ireland and Indonesia.

In Australia:

- Population: 16 millions, number of cars 7.5 millions
- SCATS can reduce:
  - 12 % fuel
  - 20 % journey time
  - 40 % number of stops
  - Traffic congestion and pollution

Comprehensive Schemes

Some priority schemes – bring together into comprehensive schemes

Schemes can be divided into two groups

- Traffic engineering techniques: one way traffic schemes, modifications to junctions layouts, control by traffic signals, or special provisions for right and left-turning traffic
- Traffic regulations, such as control of parking and stopping, loading and unloading.