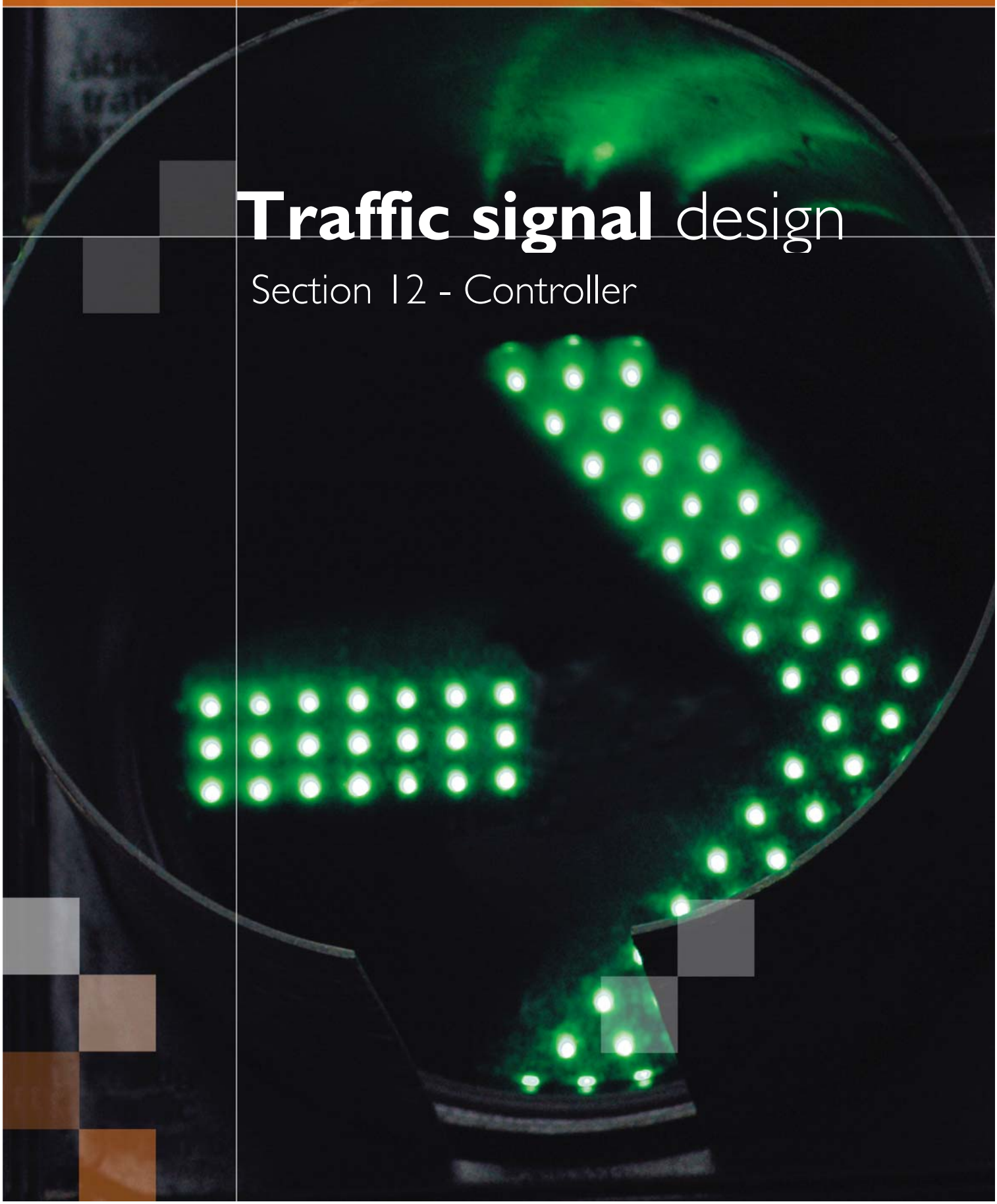
Traffic signal design

Section 12 - Controller



The traffic signal design guidelines have been developed to assist in designing traffic control signals.

The guidelines are to comprise 16 sections and 5 appendices. These are initially being released individually and in no specific order. The sections which are to be released are as follows:

Part	Title
Section 1	Investigation
Section 2	Warrants
Section 3	Design Process
Section 4	Plan Requirements
Section 5	Geometry
Section 6	Pavement Marking
Section 7	Phasing and Signal Group Display Sequence
Section 8	Lanterns
Section 9	Posts
Section 10	Signs
Section 11	Detectors
Section 12	Controller
Section 13	Provision for Future Facilities
Section 14	Signalised Mid-block Marked Footcrossings
Section 15	Special Situations
Section 16	References
Appendix A	Design Plan Checklist
Appendix B	Traffic Signal Symbols
Appendix C	Location and Function of Lanterns
Appendix D	Location and Dimensions of Components
Appendix E	Left Turn on Red
Appendix F	Level Crossing Interface – Concept of Operations
Appendix G	Level Crossing Interface – Traffic Signal Design Guidance

To determine which sections are currently available go to:

www.rta.nsw.gov.au/doingbusinesswithus/downloads/technicalmanuals/trafficsignaldesign_dl1.html

The information contained in the various parts is intended to be used as a guide to good practice. Discretion and judgement should be exercised in the light of the many factors that may influence the design of traffic signals at any particular site. The guidelines make reference, where relevant, to current Australian Standards and are intended to supplement and otherwise assist in their interpretation and application.

Traffic Signal Design

Section 12

CONTROLLER

Special Note:

As of 17 January 2011, the RTA is adopting the Austroads Guides (Guide to Traffic Management) and Australian Standards (AS 1742, 1743 & 2890) as its primary technical references.

An RTA Supplement has been developed for each Part of the Guide to Traffic Management and relevant Australian Standard. The Supplements document any **mandatory** RTA practice and any complementary guidelines which need to be considered.

The RTA Supplements **must** be referred to prior to using any reference material.

This RTA document is a complementary guideline. Therefore if any conflict arises, the RTA Supplements, the Austroads Guides and the Australian Standards are to prevail.

The RTA Supplements are located on the RTA website at www.rta.nsw.gov.au

Roads and Traffic Authority
www.rta.nsw.gov.au

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To access electronic copies of these and other guidelines go to:

www.rta.nsw.gov.au/doingbusinesswithus/downloads/technicalmanuals/technicalmanuals_dl1.html

For the latest amendments (if any) to these guidelines go to:

www.rta.nsw.gov.au/doingbusinesswithus/downloads/technicalmanuals/trafficsignaldesign_dl1.html

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Contents

Amendment record

Please note that the following updates have been made to this document.

Amendment No	Page	Description	Issued	Approved By

12.1 INTRODUCTION

This section discusses the location of the controller, its modes of operation and the special facility signals used. A description of controller operation is provided in *Traffic Signal Operation*.

12.2 TYPES AND FEATURES OF CONTROLLERS

There are two types of controller available, one has a post-mounted housing and the other has a ground-mounted housing

Post-mounted controllers are smaller than ground-mounted controllers, but have a number of disadvantages. For example:

- a post mounted controller is restricted to a maximum of 6 signal groups.
- when a site is reconstructed, the cost of conversion from a post-mounted controller to a ground-mounted controller is considerable.
- post-mounted controllers are normally mounted on a kerbside post and are therefore more vulnerable to damage than a ground-mounted controller located against the property line.

Ground-mounted controllers with a standard personality provide a maximum of 24 vehicle signal groups and 8 pedestrian signal groups, 24 vehicle detectors and 8 pedestrian detectors. All ground-mounted controllers provide a maximum of 7 phases.

12.3 LOCATION

Controllers must be located so access can be gained for maintenance purposes.

A post-mounted controller requires access to two doors, one each side of the controller. Access is usually no problem as this type of controller must be located adjacent to a Type 2 traffic signal post which is normally positioned 1.0 m from the kerb.

A ground-mounted controller has only one door for access. This type of controller is normally located adjacent to the property line with the door opening towards the footway.

The location of the controller is also affected by other conditions. Ideally, the controller should be located so that:

- a continuous 240V single phase power supply can be conveniently obtained (some poles cater for street lighting or high voltage supply only)
- it is clear of the highest flood level on record
- a communication line is available nearby for SCATS communications
- it facilitates cable entry
- it does not obstruct services
- it is not obstructed by services
- it is clear of certain high voltage poles and cabinets with electrodes or earth grids as this can affect the electronics in the controller
- noise from the operating controller does not disturb nearby residents
- it is clear of future widening proposals
- the position does not detract significantly from the visual quality of the streetscape

- there will be an unobstructed view of all approaches to the intersection for timing and maintenance purposes
- it does not unduly obstruct the footway
- it will not be unduly exposed to accidental damage by passing traffic
- access is available for maintenance personnel to park a vehicle
- it suits the type of controller to be used
- it satisfies the requirements of the local supply authority, the local council and Telstra (where necessary)

If a controller is located near hazardous materials i.e. fuel bowsers, it must be located either at a minimum clearance of 4 metres from the dispensing unit or a minimum clearance of 1 metre from the end of the extended hose, whichever is the greater clearance.

If a ground-mounted controller is located adjacent to a driveway or property line, where it is vulnerable to off-street traffic manoeuvres (such as a parking area or service station), it must be protected by steel posts or guardfence.

12.4 OPERATION OF CONTROLLERS

12.4.1 General

Controllers may operate under Non-SCATS or SCATS conditions.

12.4.2 Non-SCATS

When sites in a system are not all connected to a SCATS regional computer, they may operate as an isolated site, i.e. not coordinated with any adjacent site(s); or operate in coordination with any adjacent site(s) using:

- vehicle-pedestrian link
- sister link
- cableless link (similar to Flexilink)

12.4.2.1 Isolated

At an isolated site, the controller responds to inputs from vehicle and pedestrian detectors and operates in accordance with local time settings and local vehicle demands. There is no communication with the SCATS regional computer.

12.4.2.2 Vehicle-pedestrian link

A vehicle-pedestrian (V-P) link is used to coordinate a closely spaced (generally 200 m maximum) pedestrian-actuated site (P site) to a vehicle-actuated site (V site) by means of a cable connection. The P site is inhibited from going to the pedestrian phase until the vehicles from the V site have cleared the P site. The V site may be connected to a SCATS regional computer and operated under SCATS isolated, Flexilink or Masterlink.

There are two types of V-P link. One specifies a vehicle phase under which a pedestrian phase should run. The other specifies a vehicle phase under which a pedestrian phase should not run.

12.4.2.3 Sister link

A sister link is only used to coordinate two closely spaced (generally 200 m maximum) vehicle-actuated sites to ensure vehicle progression on the coordinated route. This is achieved in a simple manner by repeating detector actuations from each site to the other by a cable connection between the sites.

12.4.2.4 Cableless link

With cableless link, the controller responds to inputs from vehicle and pedestrian push-button detectors and from pulses generated by the coordination software resident in the controller. Coordination timing plans are changed by time of day and day of week. The operation of cableless link is identical to Flexilink except that the clock time within the controller is not kept accurate by regular reference to the SCATS regional computer. Therefore, clock times must be regularly checked on site, and adjusted if necessary, to ensure that the clock times are accurate and all clocks are synchronised so that the offsets maintain the correct time relationship for the co-ordinated route.

See Standard Flexilink Operation for further details.

12.4.3 SCATS

Where sites in a system are all connected to a SCATS regional computer, the controller may operate under the following conditions:

- SCATS isolated via a full time communications line or dial in/out modem
- Flexilink
- Masterlink

12.4.3.1 SCATS isolated

A SCATS isolated site operates as any other isolated site except that it can respond to the SCATS special facility signals and can be monitored by the regional computer. For example, lamps can be monitored, time settings can be changed, vehicle counts can be obtained and special facilities enabled or disabled.

12.4.3.2 Flexilink

Flexilink operation is the same as cableless link operation except that the clock times in the controller are kept accurate by regular reference to the time obtained from the SCATS regional computer.
See Standard Flexilink Operation for further details.

12.4.3.3 Masterlink

Masterlink allows full dynamic control by the SCATS regional computer. The data gathered from strategic detectors are used to optimise the cycle time and the phase splits for each intersection in the sub-system.
Under Masterlink operation, in the event of a communication fault between the controller and the SCATS computer or a failure of the SCATS computer, the controller automatically reverts to the fallback mode of operation. The fallback mode may be isolated or Flexilink.

12.5 SPECIAL FACILITY SIGNALS

Table 12.2 shows the typical uses of the signals which may be generated by the software in the controller or the regional computer. The controller can generally be programmed to use these signals in a different function if necessary. For example, the R-, R+, Q-, Q+, Z- and Z+ and XSF (Extra Special Facility) bit special features can be used to control or inhibit vehicle or pedestrian movements, or introduce or inhibit a special facility.

Table 12.2
TYPICAL USE OF SPECIAL FACILITY SIGNALS IN A CONTROLLER

Type of Signal	Cableless Link or Flexilink	Masterlink
R-	Controlled release of a phase	N.A.
R+	Controlled release of a phase	N.A.
Q-	Controlled release of a phase OR Allow the introduction of F1 phase in double diamond overlap OR Allow filter on B-E approach in single diamond overlap with filter option	N.A.
Q+	Controlled release of a phase OR Allow the introduction of F2 phase in double diamond overlap OR Allow filter on C-E approach in single diamond overlap with filter option	N.A.
Y-	Run coordinated using normal sequence features	Automatic introduction of pedestrian
Y+ (Flexilink)	Run coordinated using alternate sequence	N.A.
	Z- Include an extra phase in the sequence OR Allow a filter right turn OR Allow the introduction of B phase in diamond overlap designs	Include an extra phase in the sequence OR Allow a filter right turn OR Allow the introduction of B phase in diamond overlap designs
Z+	Include an extra phase in the sequence OR Allow the introduction of C phase in diamond overlap designs	Include an extra phase in the sequence OR Allow the introduction of C phase in diamond overlap designs
XSF (1 – 15)	Control filtering in diamond operation OR Control special facilities or detector operation	Control filtering in diamond operation OR Control special facilities or detector operation
XSF 16	Automatic introduction of pedestrian facilities	NA

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13 22 13

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