CONTROLLER SPECIFICATION

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Management of a team with responsibility for the assurance of:

Traffic Controller Configuration

Configuration Safety Testing

Specification guidance & associated Technical support
CONTROLLER SPECIFICATION

PRESENTATION SUMMARY
An overview of the TR2500 controller specification and MCH1827B controller specification forms.

*How to specify phase types, timing data, stages & a method of control*
*How to specify the modes, functions & facilities you require*
*How to use special conditioning*
*How to link controllers and understanding safety monitoring*

AIMS & OBJECTIVES
To enable you to demonstrate how to build a *method of control* and complete Traffic Controller *specification forms* for your syndicate project design.
CONTROLLER SPECIFICATION

Traffic Controller specification TR2500

Contents
1 Introduction
2 European Harmonised Standards
3 National Requirements
4 Normative references
5 History

Appendix A Fixed Time
Appendix B Vehicle Actuation
Appendix C Cableless Linking
Appendix D Part-Time Operation
Appendix E Hurry Call
Appendix F UTC and MOVA
Appendix G Manual Control
Appendix H Warden Control
Appendix I PSV Priority
Appendix J Pedestrian Facilities
Appendix K User Interface
Appendix L Speed Measurement
Appendix M Informative Guide

Log into: https://tssplansregistry.dft.gov.uk/login.asp and go to search to find ‘TR2500’

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TR2500 Traffic Controllers

The current TR2500 controllers from:
MOTUS (TM150)
PEEK (PTC-1)
SIEMENS (ST950)
TELENT (OPTIMA)

support the following features (refer to manufacturer data sheet for details).

✓ Low Voltage (240 volts) & Extra Low Voltage operation (48 volts)
✓ 32 phases 16 stages 8 streams
✓ Integrated UTC and/or MOVA
✓ LRT (TRAM) mode
✓ ‘Cuckoo’ swing frame only option
✓ Signals on configuration changes
✓ Storage of multiple configurations

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TR2500 Traffic Controllers

Checks correspondence between voltage level sensors for each phase switching device.

Checks that the status of the phase green switching device is consistent to that requested by the control processor.

Checks the configuration data against RAM for any errors.

If an error is detected on any of these monitors the lamp supply is switched off within 500 milliseconds.
TR2500 Traffic Controllers

There are 4 levels of access to a controller:

**Level 1:** Access to the Manual Panel

**Level 2:** Access via a handset to modify non-safety related data

**Level 3:** Access via a handset to modify safety related data

**Level 4:** Access to configuration data. This data can not be changed on site via a handset
# CONTROLLER SPECIFICATION

**MCH 1827B Specification Forms**

- General Site data
- Stage & Stream data
- Phase data
- Permitted phase combinations
- Phase to Phase Inter-green data
- Prohibited/Alternative Stage moves
- Lamp Monitor data
- Phase Delay data
- Stage data
- Master Time Clock
- Mode Priority
- Fixed Time data
- Detector data
- Cableless Linking data
- Urban Traffic Control data
- Manual Panel/Select data
- Pedestrian Link data
- Special Conditioning

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**TR2500 GENERAL SPECIFICATION FORM**

<table>
<thead>
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### CONTROLLER SPECIFICATION

#### PHASE TYPES – SIGNAL INDICATION (page 1)

<table>
<thead>
<tr>
<th>TRAFFIC</th>
<th>FILTER ARROW</th>
<th>INDICATIVE ARROW</th>
<th>PEDESTRIAN</th>
</tr>
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<tbody>
<tr>
<td>![Traffic Lights]</td>
<td>![Filter Arrow]</td>
<td>![Indicative Arrow]</td>
<td>![Pedestrian Indicators]</td>
</tr>
</tbody>
</table>

- **Traffic Lights**: Shows red, yellow, and green signals for vehicles.
- **Filter Arrow**: Indicates the direction of traffic flow.
- **Indicative Arrow**: Used to guide the flow of traffic.
- **Pedestrian Indicators**: Shows the status of pedestrian signals (Wait, Go, Flashing Green Man).

- **PEDESTRIAN**
  - Wait indicator is lit when button pressed.
  - Wait indicator goes out when green man is shown.
  - Wait indicator remains out unless button pressed during blackout.

#### PHASE TYPES – SIGNAL INDICATION (page 2)

<table>
<thead>
<tr>
<th>PELICAN</th>
<th>PUFFIN</th>
<th>TRAM</th>
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</thead>
<tbody>
<tr>
<td>![Pelican Lights]</td>
<td>![Puffin Lights]</td>
<td>![Tram Lights]</td>
</tr>
</tbody>
</table>

- **Pelican Lights**
  - Call accepted indicator lit when pedestrian demand latched.
  - Wait indicator goes out when green man shown.

- **Puffin Lights**
  - Call accepted indicator goes out when green Man shown.

- **Tram Lights**
  - PHASE STOPPED
  - PHASE PROCEED
  - PHASE ACTIVE PROCEED LEFT
  - PHASE ACTIVE PROCEED RIGHT
  - PHASE STOPPING
CONTROLLER SPECIFICATION

PHASE TYPES – SIGNAL INDICATION (page 3)

TOUCAN (FAR-SIDED SIGNAL)
- Wait indicator is lit when button is pressed.
- Wait indicator goes out when green is showing for pedestrians and cycles.
- Wait indicator remains out unless button is pressed during blackout.

TOUCAN (NEAR-SIDED SIGNAL)
- Call accepted indicator lit when pedestrian and/or cycle demand latched.
- Call accepted indicator goes out when green is showing for pedestrians and cycles.

PEDESTRIAN COUNTDOWN
- Wait indicator is lit when button pressed.
- Wait indicator goes out when Green man is shown.
- Pedestrian Count-Down indicator displays time remaining during Black-Out.
Methods of Control Facilities & Modes

Phase Appearance

Type

0 – The phase **ALWAYS** appears in its nominated stage/s.

1 – The phase appears if a **DEMAND** is present prior to the beginning of the inter-stage for the stage in which it appears.

2 – The Phase appears if a **DEMAND** is present prior to the beginning of the inter-stage or at **ANY TIME** during the stage.

3 – The phase appears as Type 2 if a **WINDOW TIMER** has not expired.

The Window Timer commences when the first phase maximum timer for the nominated stage commences.
Methods of Control Facilities & Modes

Phase Termination

Type

0 — Terminates at the **END** of the stage.

1 — Terminates when the associated phase **GAINS RIGHT OF WAY**.
   normally used for left turn filter arrows.

2 — Terminates when the associated phase **LOSES RIGHT OF WAY**.
   normally used for right turn indicative arrows.

3 — Terminates after the **MINIMUM GREEN** expires.
   This phase termination condition allows a phase to terminate after its minimum.
   Restart of a phase with this termination condition is permitted with Microsense if
   the appearance condition is type 1 2 or 3.
Methods of Control Facilities & Modes

Associated Phases

Phase association is required for:

- Left Turn **FILTER ARROW**
- Right Turn **INDICATIVE ARROW**

The **ASSOCIATED PHASE** determines when the phase appears and terminates.
CONTROLLER SPECIFICATION

Methods of Control Facilities & Modes

Dummy Phase

Can be used to create a **NEW STAGE**.

Requires no additional **HARDWARE**

Can **NOT** be set to conflict with any other phase.

Must always be entered **LAST** in the phase allocation list.
Methods of Control Facilities & Modes

Conflicts & Intergreens

Determine conflicting phase combinations

**NO CONFLICT**

**CONFLICT***

**OPPOSE**

*Note that a dummy phase can not conflict with a real phase type.

A suitable **inter-green** time (in seconds) must be entered for every conflicting phase combination.
Methods of Control Facilities & Modes

Phase Delays

**LOSING PHASE DELAY** – **EXTEND** phase green beyond the end of a stage

**GAINING PHASE DELAY** – **DELAY** start of phase green when a stage commences
Methods of Control Facilities & Modes

Stages

A **TYPE 0** phase (a fixed phase which always appears) is required for each stage.

Phases that are to be green in the start-up stage will be in the **BLACK-OUT** condition until the starting inter-green has run.

Nominate an **ARTERIAL REVERT** stage
Methods of Control Facilities & Modes

Stages

Decide on the stage to stage moves which are safe for all modes of operation.

ALLOWED – No restriction
PROHIBITED – Move not allowed
VIA MOVE - This is a move via a nominated stage
IGNORE – Move is ignored (Siemens only)
Methods of Control Facilities & Modes

Detection

Decide which is the most suitable detector type/s to deploy for each phase

LOOPS

System D - Normally XYZ (39m, 25m & 12m from the stop line)

Presence – Positioned to detect waiting/stationary traffic using a CALL & CANCEL facility

Speed - Double SDE (leading edge of 'B' loop 79m fsl)
  Triple SDE (outer assessor 159m fsl, inner assessor 91m fsl)
  Speed assessment (assessor 151m fsl)

Q Loop - Used to detect queuing traffic can be used to call Hurry Call.

Extensions - A minimum extension time of 1.6 seconds is recommended for System D. 2 seconds is recommended for a Presence Loop
CONTROLLER SPECIFICATION

Methods of Control Facilities & Modes

Detection

ABOVE GROUND DETECTION

Microwave Vehicle Detector (MVD) - Can be used in place of System D

Kerbside - Used in conjunction with Near Side unit to demand a PUFFIN phase

On Crossing - Used to extend the clearance period following the pedestrian invitation to cross Period.

Extensions - Detector has a built in extension of 0.25s but it is normal to set an minimum extension time of 0.4s

PUSH BUTTON UNIT – Can be used to demand a pedestrian or cycle phase
Methods of Control Facilities & Modes

Detection

Detector Fault Monitor

Active - Permanent demand on DFM failure
Inactive - Permanently inactive on DFM failure
No forced state - Allows the detector to be used as normal

Typical Detector Fault Monitor periods are:

30 minutes Active

9 – 72 Hours Inactive

If any detectors are likely to remain inactive for long periods set the DFM time to a higher value or consider switching off via the timetable for periods of inactivity.
Methods of Control Facilities & Modes

Master Time Clock & Timetable

The **Master Time Clock** facility provides the controller with the following facilities:

1. A software clock
2. A crystal oscillator and a standby Real Time Clock circuit which is battery supported
3. A software timetable
4. Plan timings for CLF
5. Plan influences for use with CLF plans

Using the **Timetable** it is possible to introduce and remove events by time. These events include:

a) Introduce a CLF plan
b) Introduce an Alternative Maximum
c) Switch a detector input/output state
d) Switch a sign on/off
e) Switch a phase/stage in or out
f) Switch into or out of Part-time mode
g) Switch to an alternative DFM set
h) Switch a conditioning flag active/inactive
Methods of Control Facilities & Modes

Mode Priority

For most circumstances it can be assumed that the normal order of precedence for Mode Priority will be:

1. Part Time
2. Hurry Call
3. Emergency / Priority
4. UTC/MOVA (Urban Traffic Control/Microprocessor Optimised Vehicle Actuation)
5. Manual
6. Manually Selected Modes (Via the Manual Panel)
7. CLF (Cableless Linking Facility)
8. VA (Vehicle Actuation)
9. Fixed Time
CONTROLLER SPECIFICATION

Pedestrian Facilities & Lamp Monitoring
Pedestrians

The PELICAN sequence can NOT be used at a junction.

If Pedestrian Audio or Tactile equipment is used for an All Round Pedestrian stage they MUST only operate when ALL pedestrian phases are at GREEN.

If a single phase is used for an all round pedestrian stage ensure that the number of Pedestrian signals do NOT exceed the maximum load for that phase.
CONTROLLER SPECIFICATION

Pedestrian Facilities & Lamp Monitoring

Near Side Signals

Call cancel detection can be deployed using a KERBSIDE pedestrian detector.

This sequence has no BLACKOUT period except for units used on a Central Refuge where they can be in BLACKOUT if not activated until the end of the clearance period when the RED MAN will appear.

A FIXED or EXTENDABLE clearance period may be used.

High level REPEATER signals can be used at busy sites.
Pedestrian Facilities & Lamp Monitoring

Far Side Signals

Pedestrian KERBSIDE call cancel detection can NOT be used except with a TOUCAN.

This sequence has provision for a BLACKOUT period.

A FIXED or EXTENDABLE clearance period may be used.
Red Lamp Monitoring

monitors Red Lamp Failures on nominated phases for safety.

In the event of the **FIRST** Red Lamp Failure the controller will log a fault and send a reply. There is an option to increase intergreens to the phase.

In the event of the **SECOND** Red Lamp Failure the controller will log a fault and send a reply. Any pedestrian phase set to conflict with the phase will be inhibited

Red Lamp monitoring is mandatory for

✓ Audio & Tactile Facilities
✓ Part-Time Signals at Roundabouts
CONTROLLER SPECIFICATION

Summary

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Controller Specification Summary

- The PELICAN sequence can **NOT** be used at a junction
- Are both CLF and VA required? If so CLF to have a **HIGHER PRIORITY**
- Part Time must be active for a minimum of approx' **10 MINUTES**
- If multi-stream **LINKING** is normally required to ensure efficient operation
- Consider dependency and **NOMINATE PRIORITY** & assess the potential risks if a **MULTIPLE JUNCTION** is to be controlled by **ONE CONTROLLER**
- Assess **HOW MANY CABLES** are to be terminated in the controller & consider whether to use a cable termination cabinet
Controller Specification Summary

- Check that the controller can support your requirements and assess the need for **ADDITIONAL PHASES IN THE FUTURE** and make provision for further expansion when ordering a new controller.

- As a quick guide assume each lamp will use **0.25 AMPS** & check the fuse capacity on the lamp switch card is not exceeded.

- If a single phase is used for an all round pedestrian stage ensure that the number of aspects **DO NOT EXCEED THE MAXIMUM** for that phase.

- If Pedestrian Audio required remember that this should only operate when **ALL PEDESTRIAN PHASES ARE AT GREEN**.
CONTROLLER SPECIFICATION

Summary

Controller Specification Summary

Detection?
- Check that the controller can support your requirements and assess the need for additional detector inputs in the future and make provision for FURTHER EXPANSION when ordering a new controller.

Special Conditioning?
- Ensure that requirements are clear and Mode specific and provide a ‘plain English’ explanation of what is required.

Linking?
- If cable less Linking Facility is to be used ensure the clocks can be SYNCHRONISED.
- If a link cable is used ensure that it FAILS SAFE (open circuit active).
Lamp monitor and Red Lamp Monitor?

- If possible monitor all lamps (including WAIT lamps)
- Red Lamp monitoring is MANDATORY for Audio & Tactiles and Part-Time Mode
- Red Lamp monitoring is recommended for Single working signals