SIEMENS TRAFFIC CONTROLS Sopers Lane POOLE Dorset BH17 7ER

**SYSTEM/PROJECT/PRODUCT:** STC UTC SYSTEM

# **DATA PREPARATION GUIDE**

# **for an**

# **STC UTC SYSTEM**

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#### ISSUE STATE

Note: Source of documents is shown under Type as below. 1=Paper, 2=VAX, 3=Microfilm, 4=CALTEXT Disc, 5=DECmate Disc, 6=Paper Insert, 7=MAC Disc, 8=LIFESPAN, 9=SUN, 10=AMW

The document comprises the following components:



# **CONTENTS**









# <span id="page-6-0"></span>**1. INTRODUCTION**

#### <span id="page-6-1"></span>**1.1 Purpose**

The aim of this document is to provide sufficient information, with the aid of worked examples, to show how the essential features of a road system can be collected for input into an STC UTC System.

A computer based Urban Traffic Control System that can adapt itself to the various traffic patterns and flows within a town or city does so by modelling the road network. If this model and hence the control of traffic is to be successful the computer must first be given accurate details of the layout and features of the road network.

#### <span id="page-6-2"></span>**1.2 Scope**

The features that are described in this document relate to an STC Urban Traffic Control System. It is assumed that the reader is an experienced traffic engineer familiar with traffic control and has available the System Handbook for an STC UTC System, reference [1.3.2\(c\).](#page-6-6)

# <span id="page-6-7"></span><span id="page-6-3"></span>**1.3 Related documents** 1.3.1 Parent Documents 1.3.1(a) 666/UH/16940/000 System Requirement Specification for an STC UTC System 1.3.2 Reference Documents 1.3.2(a) 666/KE/16066/000 UTC Glossary of terms 1.3.2(b) 666/HD/16940/000 Data Preparation Handbook for an STC UTC System 1.3.2(c) 666/HE/16940/000 System Handbook for an STC UTC System 1.3.2(d) 666/HF/16940/000 SCOOT User Guide 1.3.2(e) 666/HE/43100/000 TC12 Installation, Commissioning and Maintenance Handbook 1.3.2(f) 666/HI/16940/000 Data File Format Guide for an STC UTC System 1.3.2(g) 666/UH/16940/xxx Customer Requirement Specification (replace xxx with unique customer reference)

# <span id="page-6-8"></span><span id="page-6-6"></span><span id="page-6-4"></span>**1.4 Definitions**

See UTC Glossary of terms, reference [1.3.2\(a\).](#page-6-7)

#### **1.5 Issue state and amendment**

<span id="page-6-5"></span>Issue 01.00D For review Issue 01.00 First issue change ref. DC 7238/7239 Issues 02.00 to 07.00 Not created Issue 08.00 Issue for UTC S/W release 8.0



# <span id="page-8-0"></span>**2. OVERVIEW**

#### <span id="page-8-1"></span>**2.1 Purpose**

This section describes a road network for an imaginary town and the facilities and equipments that make up a UTC network. In real life it is unlikely that everything described here would appear within one town or city. Subsequent sections discuss each of these facilities and equipments and show how the data is derived for the data entry forms.

It is strongly recommended that the engineer use this guide initially to work out his equipment requirements. Subsequently, prior to factory testing it is usually necessary to complete the data forms in full, either for the engineer's or STC's input.

#### <span id="page-8-2"></span>**2.2 Scenario**

- 2.2.1 Beresford St Marcus is an old town with narrow winding streets. The Cummings canal runs through the East side of the town over which the only crossings are Bodger Bridge and Carter Crossing. Bodger Bridge operates a tidal flow system for the morning and evening peaks. Carter Crossing is a lifting bridge that might be raised two or three times a day. Extensive variable message signs are to be used in the streets around these bridges to inform motorists when the tidal flow system is operating and also to pass information if the Carter Crossing is raised.
- 2.2.2 The Maynard Shopping Centre is pedestrianised and there are three car parks in close proximity to this centre. Signs are to be used on the outskirts of the town to inform the motorists which car parks have spaces and which way to travel to them. There are also signs close to each car park showing its status (FULL, ALMOST FULL, SPACES, etc).
- 2.2.3 The network consists of six junction controllers and three pelican controllers. All of these are to be operated under SCOOT control. The location of all the SCOOT detectors has to be identified well in advance to enable the data transmission requirements to be established. The junctions have a variety of different methods of control such as demand dependent stages, removable stages by time of day, parallel stage streams, secret no right turn signs etc.
- 2.2.4 On the main through street, Dickinson Drive, there is a fire station. They require facilities to call Green Wave routes in 4 different directions for emergency vehicles leaving the station.
- 2.2.5 Around the city there are to be some strategically placed counting and occupancy detectors. With SCOOT this would not normally be necessary but the County Engineer is doubtful that SCOOT works and wants to have the facilities for Automatic Plan selection as well!
- 2.2.6 A wall map is required that shows the status of each junction and pelican using coloured LEDs. Other equipments such as the lifting bridge and occupancy detectors also have indicators on the map.
- 2.2.7 All equipments in the system have to be identified by System Code Numbers (SCNs). Bearing in mind all the facilities mentioned above, the engineer should

list all the items and work out how many control and reply bits of information are required for each one. He should then be in a position to identify the number of OTUs and hence the number of telephone lines that are required.

2.2.8 [Figure 1](#page-47-0) in [Appendix A](#page-46-0) shows a map of the town.

# <span id="page-9-0"></span>**2.3 SCNs**

The reader is recommended to read the System Handbook, reference [1.3.2\(c\),](#page-6-6) in order to gain an understanding of the SCN identification before reading any further.

# <span id="page-10-0"></span>**3. COMPUTERS**

#### <span id="page-10-1"></span>**3.1 Description**

The majority of UTC Systems use one computer. Only where the number of signals is high or the customer has special requirements is there a need for more than one computer.

#### <span id="page-10-2"></span>**3.2 Identifier**

The computer SCN is addressed in the system by the letter "H". As Beresford St Marcus is a small town there is only one computer that is given the SCN H01000. SCNs are always five digits long and 15 characters are allowed for the description. If a second computer had been required this would have the SCN number H02000.

# <span id="page-11-0"></span>**4. TC 12 PC**

# <span id="page-11-1"></span>**4.1 Introduction**

In systems with TC12 a PC handles the interface between the computer and the instation modems. The PC has a number of intelligent modem driver boards, each of which could in theory drive 96 OTUs with two control and six reply bytes. The exact capacity of each board depends on the speed, telephone line configuration and number of control and reply bytes at each site. The user should read the TC12 Installation, Commissioning and Maintenance Handbook, reference [1.3.2\(e\),](#page-6-8) to get a better understanding of the setup of an OTU.

# <span id="page-11-2"></span>**4.2 Identifier**

Each TC12 PC is identified by the letter "E" followed by a five digit number. The first two digits must be the same as the computer number.

# <span id="page-11-3"></span>**4.3 Description**

Within the PC there are intelligent modem driver boards each with 16 ports. Each of these ports is configured from the TC12 data entry screen. The data entry is "intelligent" in as much as when each OTU is added with the number of control and reply bytes, the remaining capacity of that port is calculated and displayed.

# <span id="page-12-0"></span>**5. SUB - AREAS**

#### <span id="page-12-1"></span>**5.1 Introduction**

A Sub-Area is a network of junctions, pelicans or equipments that normally form a traffic entity. Everything in a Sub-Area usually changes plans at the same time, although this is not a rule.

#### <span id="page-12-2"></span>**5.2 Identifier**

Sub-Areas are identified by the letter "A" followed by a five digit SCN. The first two numbers of this SCN define the Sub-Area. In Beresford St. Marcus, A11000 defines Sub-Area 11, the Ansell Avenue area. E.g. J11111 is a junction within Sub-Area 11.

# <span id="page-13-0"></span>**6. OUTSTATION TRANSMISSION UNITS**

#### <span id="page-13-1"></span>**6.1 Introduction**

An outstation transmission unit (OTU) on site interfaces between the equipment and the telephone line back to the computer. Normally every controller has one OTU. In some cases two controllers close together may share an OTU, particularly if one is a junction and the other a pelican. As well as junction data the OTU may also have inputs connected to it from any other piece of equipment capable of being controlled or monitored by the System, such as car park status or diversion sign control. If these other equipments are a long way from a junction controller, say greater than 200 metres, they may have their own dedicated OTU.

#### <span id="page-13-2"></span>**6.2 Identifier**

An OTU is addressed in the system by the letter "X". As with every other piece of equipment an OTU SCN has five digits, the only difference being that it must end in "0". If the junction had been designated J01121 then the OTU would be designated X01120. J01122 would be a second junction on the same OTU. If there was a pelican on the same OTU it could be designated P01121, although to avoid duplication of numbers it may be better to give it the number P01123. Note the system uniquely identifies them because one has a P prefix the other a J prefix. Similarly if there was a counting detector this could be allocated D01127. By using this type of numbering it is easy to see to which OTU any piece of equipment is connected.

#### <span id="page-13-3"></span>**6.3 Telecommand 8 Transmission System**

With the STC Telecommand 8 data transmission system, a modem can carry up to four 16-bit addresses. This could be used so that one OTU uses all four addresses or the addresses are shared between up to four OTUs. In this case each OTU would have only one address. The junction and pelican data at an OTU site must be returned in the first 16-bit address on an OTU. Other addresses are then used to return SCOOT detector or other reply information. A SCOOT detector uses 4 bits on an address, thus four SCOOT detectors can be returned in one 16-bit address. If the junction data is using all of the first 16-bit address then the maximum number of SCOOT detectors that can be handled on one OTU is eight. This is because the total number of wiring inputs into the OTU is restricted to 24, each return bit from the controller or controllers being one input.

Most SCOOT junctions use at least two addresses and frequently three or four. To optimise the use of the instation data transmission equipment it is important to calculate the number of addresses at each site and then allocate the internal addresses accordingly. e.g. two 2-address OTUs can be placed on one modem or perhaps one 3-address OTU and one single address OTU. An example of a single address OTU may be a pelican with its own OTU and perhaps two SCOOT detectors. All this information can be returned within one 16-bit address, with bit numbers ranging from 0 to 15.

The individual configuration of each OTU is shown with the information for the main equipment attached to the OTU. The IRN number is the internal computer address and can be in the range 1 to 512.

With a Telecommand 8 system an OTU cannot be allocated over a 4-address boundary. Thus a 2-address OTU cannot be allocated internal addresses 4 and 5 for example. The primary address is the starting address for that OTU on a modem. Each OTU is wired individually to determine the address. This number is one of 1, 4, 7 or 13. If there were two 2-address OTUs on a modem, the first would start at primary address 1 and the other at 7.

The address number determines how many addresses are used on the OTU. A sampled input pointer determines at what point in the addresses the SCOOT detector data is returned. A

value of 16 would indicate that they are starting on the second address. Note also that SCOOT detectors must be the last equipments on an OTU.

NOTE:The internal numbering of each bit within an address goes from 0 to 15.

# <span id="page-14-0"></span>**6.4 TC 12 Data Transmission System**

TC12 is a more modern data transmission system that can run at 600/1200 baud. The fundamental difference between Telecommand 8 and TC12 is that each OTU operates in 8-bit control and reply bytes as opposed to the Telecommand 8 system of 16-bit addresses. An OTU can be configured for up to three control bytes (24 bits) and up to 14 reply bytes (112 bits).

The freestanding OTU has 16 outputs and 32 inputs. An input can be defined as a reply bit from a controller or piece of equipment, or a single SCOOT detector. The OTU can be configured for up to six count, queue or occupancy detectors. Note that a U/D SCOOT detector occupies two inputs.

There is a maximum OTU capacity for each TC12 modem. OTUs may be configured on the same modem until this capacity is reached and this is determined by summing the number of control and reply bytes configured together with the total number of OTUs added. The data entry software advises the user of the spare capacity available on each modem.

# <span id="page-15-0"></span>**7. OUTSTATION MONITORING UNITS**

#### <span id="page-15-1"></span>**7.1 Introduction**

A link can be made between a Remote Monitoring System and STC UTC systems. This enables RMS faults to be recorded into the UTC log and also the archiving of count detector data from remote sites.

# <span id="page-15-2"></span>**7.2 Identifier**

An OMU site is identified by the letter "Y" followed by a five digit number following the standard UTC convention.

# <span id="page-16-0"></span>**8. JUNCTIONS**

### <span id="page-16-1"></span>**8.1 Introduction**

This section describes each of the five junctions in the town and how the data is interpreted. All junctions have had the PROMs configured for real-time clock synchronisation, remote reconnect, lamp failure and manual control.

The stage diagrams and intergreen tables are contained in [Appendix B .](#page-50-0)

#### <span id="page-16-2"></span>**8.2 Identifier**

A junction controller is addressed in the system by the letter "J" and the normal five digits. The first junction on an OTU would normally have the last digit as "1" and the second the last digit as "2".

#### <span id="page-16-3"></span>**8.3 Data format types**

The control and reply data bits for junctions are defined within format types. These format types define the data bit position of items such as real time synchronisation, stage demand bits, remote reconnect reply etc. The data bits start after the stage force bits.

# <span id="page-16-4"></span>**8.4 Junction J11111**

This is a straightforward 2-stage controller with both stages forced, i.e. there are no demand dependent stages here.

This OTU is also controlling a pelican P11113, which is 150 metres away, by a linking cable. This same cable is also driving a car park information sign at the pelican site.

NOTE: There is some disparity between the notation for 141 controller bits and those used by STC. It is expected that this disparity will soon disappear. However, it should be remembered that any new feature that appears within a 141 controller will not automatically appear on STC systems, although in the course of time they may well do so.

# <span id="page-16-5"></span>**8.5 Junction J11121 and J11122**

The controller at this site is controlling two junctions, J11121 as stream 1 and J11122 as stream 2. Both have a demand dependent stage. F1-F3 control J11121 and F4-F6 control J11122. As far as the computer is concerned J11122 is a separate junction and therefore F4-F6 translates directly into F1-F3. Certain bits are common to both junctions such as CS, MC, RR, DF, LF1 and LF2. These bits are returned in the format type for the first junction J11121. It is recommended that streams on the same controller are always allocated to the same link list. Then if any fault occurs both streams are dropped from computer control. For junction J11121 a push button pedestrian demand increases the minimum stage length of stage 2 and the intergreen from stage 2 to stage 3.

# <span id="page-16-6"></span>**8.6 Junction J11141**

This is a 4-stage junction. Stages 2 and 4 are demand dependent, with stage 4 being an all round pedestrian stage with no traffic movements. The OTU here also returns information on city car park signs and from a counting detector, which is used for automatic plan selection.

# <span id="page-16-7"></span>**8.7 Junction J21111**

This is a 3-stage junction with no demand dependent stages. The bridge into the town, downstream from this junction, operates a tidal flow system in the morning and evening peaks. There is a sign on the southbound approach to J21111 that tells drivers to turn left only

during the evening peak here. The OTU here controls this sign. This is driven as a special facility within the UTC system. There are also two counting detectors sited near this junction that are used for APS.

Stage 3 is used as a clearance stage for use in the evening peak and is omitted during the rest of the day. Under SCOOT control this is called for a fixed period of 15 seconds and is designated a removable stage.

#### <span id="page-17-0"></span>**8.8 Junction Plans**

8.8.1 Every junction and pelican in the system can be allocated 40 fixed time plans, 6 SCOOT translation plans and 100 green wave plans. Individual configurations may vary according to particular customer requirements; see [1.3.2\(c\).](#page-6-6)

The fixed time plans are allocated numbers 1 through 40, the SCOOT plans 41 through 46 and the green wave plans 48 through 147. **Note:** Plan 47 is known as the Test Plan and is used for temporary changes to plan timings. It is invoked by use of the OFST command. The construction of SCOOT plans is covered in the section on SCOOT.

Detailed checks are carried out during plan preparation to ensure that the structure of the plan is correct. If for example, the junction has three stages and B is omitted then the controller must have an intergreen defined for the change from A to C. If a stage is demand dependent then it must have the correct demand bit associated with it if it is to be forced.

The times allocated to each stage are event times within the plan cycle time and are not stage duration times.

#### **J11111**

A typical plan for J11111 might look like:

J11111 CY60, A 01, B 34

This shows that the junction has a 60 second cycle with A forced at the first second in the cycle and B forced 33 seconds later at second 34 in the cycle. Remember this junction has no demand dependent stages. The green time for stage A would be 33 seconds less the B to A intergreen of 9 seconds. The green time for stage B would be 27 seconds less the A to B intergreen of 7 seconds. The position of the event times are important as they determine the offset to adjacent junctions for linking. This junction is forcing stage A 10 seconds before stage A at J11121. The measured offset on the street would be slightly different as the preceding intergreens are different.

#### **J11121**

This junction has stage B demand dependent. If this stage is to be enabled the plan might look like:

#### J11121 CY 70 A 11, B 33, AB 35, C 53

This plan holds the controller on stage A if there is no local demand present for stage B. Stage B is given a two second window that allows the controller to start a change from stage A to stage B. The window is closed at time 35 but the controller continues its move into stage B and stays there until time 53 when stage C is forced. With modern microprocessor controllers the window could be shortened to one second.

J11121 CY 70, A 11, B 33, C 53

This plan forces a demand for stage B from the computer, so that stage B appears every cycle. **J11122**

This junction has three stages all forced. The plan may look like:

J11122 CY 70, A 11, B 30, C 55

#### **J11141**

This junction has two demand dependent stages B and D. A typical plan enabling both of these stages may look like this:

#### J11141 CY 95, A 01, B 22, AB 24, C 31, D 79, AD 81

In this plan if there is no demand for stage B then the running time is given to stage A, which also picks up the time if there is no demand for stage D.

#### **J21111**

This junction only uses stage 3 as a clearance stage during the evening peak. The evening peak plan may look like: J21111 CY 120, A 01, B 65, C 97 For the rest of the day the plan may look like: J21111 CY 70, A 22, B 59

#### <span id="page-18-0"></span>**8.9 Controller checks**

Controller checks is a program, usually run during the night, which carries out checks on the controller timings such as intergreens, minimum greens etc. This program is really a left-over from the days when controllers were much less reliable and their timings were likely to drift. With modern microprocessor controllers it is debatable whether this needs to be run. The normal computer operation carries out checks for intergreens and minimum violations all the time.

# <span id="page-19-0"></span>**9. PELICANS**

### <span id="page-19-1"></span>**9.1 Introduction**

This section describes each of the three pelicans in the system and how the data is interpreted. All pelicans have lamp failure monitoring, most also have the remote reconnect facility.

# <span id="page-19-2"></span>**9.2 Identifier**

A pedestrian controller is addressed in the system by the letter "P" followed by a five digit number.

# <span id="page-19-3"></span>**9.3 Pelican P11113**

This is controlled from the same OTU as J11111 and allows pedestrian access from the park area to the paths and facilities of the canal. The local configuration is:

Not GX time 21 GX time 7

# <span id="page-19-4"></span>**9.4 Pelican P31111**

This allows pedestrians access to the Castle from the shopping Centre and associated car parks. It is on an OTU that replies the occupancy of the car park and consequently has a reduced number of reply bits. The local configuration is:



# <span id="page-19-5"></span>**9.5 Pelican P31131**

This allows pedestrians access to the Shopping Centre from the car park C31131. It is controlled from the same OTU as the Fire station and car park status bits. The local configuration is:



# <span id="page-19-6"></span>**9.6 Pelican Plans**

Pelican plans use the same numbers as those for junction plans.

P11131 CY 60, P 33, V 35

In this plan the pelican is allowed to change to pedestrians at time 33 seconds in the cycle. The window automatically closes after two seconds at time 35 seconds.

If it is required to force the pedestrian stage the "PX" bit is sent, e.g. P11131 CY 60, P 33, V 35

A pelican may be double cycled by repeating the event times twice e.g. P11131 CY 70, P 1, V 3, P 36, V 38

# <span id="page-20-0"></span>**10. COUNT DETECTORS**

## **10.1 Introduction**

The City uses count sites for three main purposes, calculating car park occupancy, providing count information and for triggering APS.

> <span id="page-20-2"></span><span id="page-20-1"></span>NOTE: Count detector information can be returned after bit 15 (as well as before) on the OTU but must be before the SCOOT detectors.

#### **10.2 Identifier**

Count detectors are addressed in the system by "D" followed by a five digit number. There are six counting detectors in the system, D21111, D21112 and D11141 are used in association with automatic plan selection. D31121, D31122 and D31123 are associated with entries and exit for car park C31121.

If it is decided to use some of the SCOOT detectors as counting detectors then extra "D" numbers can be allocated to the system. These are effectively dummy numbers and SCOOT links can be added or removed from them. Within data entry they are allocated type 0.

# <span id="page-20-3"></span>**10.3 D21111**

Detector D21111 returns occupancy data as well as counting data. The same "D" number is used for both.

# <span id="page-21-0"></span>**11. QUEUE DETECTORS**

## <span id="page-21-1"></span>**11.1 Introduction**

It is important not to confuse queue detectors with occupancy detectors. A queue detector is triggered when a vehicle is stationary on the detector for a predetermined length of time. An occupancy detector measures the amount of time a detector is occupied.

There is one queue detector in the system located just to the West of junction J11121. It is intended that this detector be used along with the counting detectors D21111 and D21112 in the decision making process for the automatic plan selection.

#### <span id="page-21-2"></span>**11.2 Identifier**

A queue detector is addressed in the system by a letter "Q" followed by a five digit number.

# <span id="page-22-0"></span>**12. SPECIAL FACILITIES**

#### <span id="page-22-1"></span>**12.1 Introduction**

Special facilities are used to control equipments with two states. The equipment is turned "on" when the single control bit is sent out. Examples of this would be secret signs, where a reply confirmation can be configured and the confirmation of a green wave, where no reply is needed.

#### <span id="page-22-2"></span>**12.2 Identifier**

A special facility is addressed in the system by the letter "F" followed by a five digit number.

# <span id="page-22-3"></span>**12.3 F31111, F31112, F31113**

In Beresford St. Marcus, three special facilities are used to indicate to the users in the Fire Station that the selected Green Wave is active. They see this as a light, typically green, on the selection panel.

# <span id="page-23-0"></span>**13. GREEN WAVES**

#### <span id="page-23-1"></span>**13.1 Introduction**

The Green Waves are designed to allow fire engines to leave the town through either Carter Crossing or Bodger Bridge, or to access the airport. They are called using a Green Wave Route Selection Box located at the fire station. Once the route is active a lamp lights on the box indicating the active route. Additional emergency vehicles may pass down the route in successive waves.

#### <span id="page-23-2"></span>**13.2 Identifier**

A Green Wave is addressed in the system by the letter "G" followed by a five digit number.

#### <span id="page-23-3"></span>**13.3 Remote Requests**

Each button on the Selection Box is seen by the System as a Remote Request. This is associated with a green wave plan that starts when the button is first pressed. Each remote request is allocated a "Z" number followed by a five digit number; the green wave is then allocated to that remote request number.

#### <span id="page-23-4"></span>**13.4 Special Facilities**

In addition to a button for each route the box has a lamp for each route. This is seen by the System as a Special Facility. When the route is active the Special Facility is asserted and the lamp lights. Each special facility is allocated an "F" number followed by a five digit number. This is then linked with the associated remote request on the remote request data entry screen. The convention is for the Special Facility and Remote Request SCNs to match, e.g. F31111 and Z31111.

# <span id="page-23-5"></span>**13.5 Green Wave (triggered by vehicle detector)**

In Beresford St Marcus the Fire station is sufficiently close to the first junction that the timing for the Green Wave is predictable. If the junction was a long way away, or progression was unpredictable the Green Wave could be started by using a special vehicle detection system. Then, as the firemen left the station, they would pre-select the route and when the vehicle subsequently activated the detector it would start the Green Wave route. The single bit that is returned by the detector is known as the EV bit.

# <span id="page-23-6"></span>**13.6 Green Wave Plans**

Each green wave plan contains the timings for one route only and may consist of up to 16 intersections and/or pelicans. Green Wave route 1 G11111 uses plan 50 and progresses the emergency vehicle through J11141, P11113 and J11111.

The junction plan may look like:

J11141OFFSET 10 C 30

J11111OFFSET 34 B 60

The pelican plan may look like:

P11113 OFFSET 20, V 45

At the first junction J11141 stage C is called 10 seconds after the remote request for the green wave is started and is held for 30 seconds duration. The pelican P11113 is then inhibited from changing for 45 seconds, 20 seconds after the remote request was called. Finally J11111 stage B is called 34 seconds after the start of the green wave for a duration of 60 seconds. It is common practice for the durations to be increased the further from the starting point the vehicle travels to compensate for unexpected hold ups.

After each pelican or junction completes the Green Wave, it is "crash" changed onto the previous running plan to resume correct operation as quickly as possible. If this is thought to be unsatisfactory, then the plan can contain an optional clearance stage that is run as the green wave terminates, e.g.

J11141 = DUR 20, C 10, A 20

# <span id="page-25-0"></span>**14. TIDAL FLOW**

# <span id="page-25-1"></span>**14.1 Introduction**

The Tidal Flow Scheme (TFS) controls the centre lane of Bodger Bridge, a three lane road, by means of overhead signs. The signs face in both directions and show one of the following aspects:

Straight Ahead Arrow

Move Over Arrow

Red Cross

The TFS has a number of signs that are all controlled by one local, programmable, controller. To change from, say, centre lane inbound to centre lane outbound the sequence of sign aspects shown below would be used:



The duration of the Move Over aspect is one minute and that of the double Red Cross is three minutes. After changeover the Straight Ahead arrow runs for a minimum of four minutes. These times are programmed into the TFS local controller and may be changed from time-totime by re-programming the controller.

#### <span id="page-25-2"></span>**14.2 Identifier**

The tidal flow scheme is identified by the letter "L" followed by a five digit number.

# <span id="page-26-0"></span>**15. CAR PARKS**

#### <span id="page-26-1"></span>**15.1 Introduction**

As the development of the Maynard Centre was piecemeal the car parks around the centre use a number of different ways of reporting their status to the UTC System.

#### <span id="page-26-2"></span>**15.2 Identifier**

A Car Park is addressed in the System by the letter "C" followed by a five digit number.

## <span id="page-26-3"></span>**15.3 Car Park C31131**

This car park has some intelligence of its own and indicates its state directly using three bits. Two of the bits (CA and CF) are calculated from the occupancy data returned to the unit from local count detectors, the third bit (CC) indicates whether or not the car park has been closed by the car park's own operator. Because this bit is present the UTC System operator is unable to close the car park. Omitting the CC bit means that only the UTC System operator can close the car park.

The reply data co-exists with the fire station control panel and pelican P31131 on the OTU 31130.

# <span id="page-26-4"></span>**15.4 Car Park C31121**

This car park has no on-site intelligence and the System uses count detectors located at the entrance and exits to determine the car park state.

Standard count detectors are located on all approaches to and exits from the car park. This car park has two exits and one entrance requiring three detectors altogether, D31121, D31122 and D31123 respectively. Each detector has been set up to change state when two vehicles have passed over the loop so that an accurate occupancy can be calculated.

The car park capacity is 650 cars, which is large by local standards. Because of its proximity to the Maynard Centre it is also the most popular car park in the System. Most cars arriving at the car park come from Dickinson Drive and Maile Mews and roughly 20 cars arrive at the park after the car park sign S31121 has changed to the full state. Consequently the full increasing threshold has been set to 620 (allowing for some errors) and the almost full increasing threshold to 580. In order to stop the signs changing state frequently and to provide good information to new arrivals at the town, the two decreasing thresholds have been set to 600 and 550 respectively.

The car park equipment that controls the barrier is connected to the system. When the system believes that the car park is full the barrier is not raised.

# <span id="page-26-5"></span>**15.5 Car Park C31111**

The on-site intelligence at this car park derives its own occupancy from internal count detectors and controls the barriers itself.

The data is returned on OTU X31110 as a 13 bit Binary Coded Decimal value. Although the system allows up to 1999 cars in a car park this car park only has capacity for 300. Because of its location on the west of town it is not very popular, except for visitors to Barnard Castle. For this reason the increasing thresholds have been set to 290 and 280, whilst the decreasing thresholds have been set to 260 and 250.

# <span id="page-26-6"></span>**15.6 Car Park C31211**

The airport parking facilities use a Pay and Display system where ticket machines are connected to a central PC system. This in turn is to be connected to the UTC system that can then receive a regular update of ticket sales. By choosing a suitable conversion factor the UTC system can then maintain an approximate occupancy record for this parking facility.

# <span id="page-28-0"></span>**16. CAR PARK SIGNS**

#### <span id="page-28-1"></span>**16.1 Introduction**

There are currently five car park signs on the System. The Council acknowledges that this is insufficient but current finances do not permit more to be installed. Priority has been given to the route over the Carter Crossing that is the common tourist approach to the City. Most people who cross the Bodger Bridge are commuting to and from work.

#### <span id="page-28-2"></span>**16.2 Identifier**

Car park signs are addressed by the System using the letter "S" followed by five digits. There are three types of car park sign:

#### 16.2.1 Entrance

This sign is for a single car park and is located at the entrance to its car park. The legend would normally say "SPACES" or "FULL".

#### 16.2.2 Named

This type of sign directs motorists to a specific car park; the legend may display "SPACES", ALMOST FULL", "FULL" or "CLOSED".

#### 16.2.3 City

This type of sign directs motorists to an area of the city, giving information on the state of a number of car parks.

# <span id="page-28-3"></span>**16.3 Car Park Sign S11111**

This sign is intended to direct traffic to either C31121 or C31111 depending upon their state. Because of the large size of C31121 it is preferred to fill this rather than C31111 and so a City sign is used. C31121 being used as Group 1 and C31111 as Group 2. In this way people are directed first to C31121 and when it becomes full to C31111.

# <span id="page-28-4"></span>**16.4 Car Park Sign S31121**

This sign directs people to one of the three car parks using a city sign, firstly C31121, then C31131 and lastly C31111.

# <span id="page-28-5"></span>**16.5 Car Park Sign S31122**

This sign is at the entrance to C31121 and controls the barrier stopping access to the park. If the car park's entrance state is SPACES then the barrier is allowed to rise, if its full then it remains down.

# <span id="page-28-6"></span>**16.6 Car Park Sign S31123**

This is a named sign on the approach to the car park indicating whether or not there are spaces.

#### <span id="page-28-7"></span>**16.7 Car Park Sign S11142**

This city sign indicates whether or not there are spaces in the city centre car parks; the three car parks are considered as a group to determine the sign state.

# <span id="page-29-0"></span>**17. DIVERSIONS**

## **17.1 Introduction**

Beresford St Marcus has three diversions:

- <span id="page-29-1"></span>a) The first is associated with the Carter Crossing lifting bridge. When the bridge is raised the signs V11111 and V11112 are changed to indicate to motorists that the bridge is closed and that they should divert in the direction indicated. This diversion has been allocated the number U11111.
- b) A single sign version of U11111 for when Nash Terrace is closed is termed U11112.
- c) The second diversion is associated with the closure of Nash Terrace for the annual beer festival. This diversion has been allocated the number U11121 and uses the diversion signs V11121 and V11122. It is introduced by an entry in the date of year timetable or by operator command.

#### <span id="page-29-2"></span>**17.2 Identifier**

A diversion in the system is addressed as a "U" followed by a five digit number.

# <span id="page-29-3"></span>**17.3 Remote Request**

The lifting bridge across the canal was not designed with traffic control in mind. Everyone considers it possible and indeed beneficial to automatically start the diversion when the bridge lifts, but the canal and traffic authorities cannot agree on who should pay for the necessary adaptation. Until this is resolved a latching push button has been installed in the control panel for the bridge. This is seen by the UTC System as the remote request,  $Z11111$ , moving from 0 to 1 and consequently the diversion is called. When the button is released, a call is sent to cancel the diversion.

# <span id="page-29-4"></span>**17.4 Diversion Sign List**

This is used to nominate those signs that are set by the System when the associated diversion is active.

#### <span id="page-29-5"></span>**17.5 Diversion Implementation Delay**

The System provides a facility to delay the introduction of a diversion by up to 15 minutes. For Beresford St Marcus there is no reason to use this facility.

# <span id="page-29-6"></span>**17.6 Diversion Sign Implementation Delay**

Traffic builds up on the approach to the bridge because locals know what is happening and choose to queue rather than drive around. It is therefore necessary to continue to divert traffic away from the bridge for a minute after it has come down. In order to achieve this the delay value is set to 0.5 minutes and the diversion sign group for all affected signs is set to 1.

# <span id="page-29-7"></span>**17.7 Dependent Diversion**

When Nash Terrace is closed and the lifting bridge is raised this has a dramatic effect on the network. It is accepted under these conditions that vehicles will queue regardless of what is done and a single sign diversion U11112 is actioned.

In order to decide what diversion is to be actioned it is first necessary to decide what is supposed to happen when more than one diversion is requested at any instant in time. In the case of Beresford St Marcus there are two diversions, U11111 and U11121, which occur if no other diversions are active. If both are requested then U11112 is started and the others cancelled.

In order to use this facility it is necessary to set up a diversion group and diversion *types*. The group chosen is number 1 and the diversion *types*, U11111 is 1, U11112 is 2 and U11121 is 3.

#### 17.7.1 Dependent Diversion Rule Tables

This table is used to determine which *state* the diversions and plan on a sub-area should be in operation after a new diversion request. The table is indexed using the current *state* of the diversions in the 'group' and the *type* of the new diversion request.

The *state* is calculated using the *type* of each diversion to generate a binary value. *Type* 1 represented by "001", 2 by "010" and 3 by "100". For each active diversion the binary patterns are ANDed together, for example if *type* 1 and 2 are active the pattern becomes "011" or decimal 3.

This may be simply represented using a table. The rows show which diversion is starting whilst the columns show diversions which are already active. The 'cell' selected becomes the new *state* for the diversions in the group.



Do not forget that this is expressed in terms of *states*, so that the two entries with *state* of 4 are really requesting *type* 3 (pattern "100") to be started.

The right hand part of the table is all zeros as it is not possible to get into that *state*. If it occurs then the simplest solution is to cancel all diversions.

This now needs to be translated into the *state* order for data entry.



Two columns have been switched because a *state* of 4 represents *type* 3 active, whilst a *state* of 3 represents *type*s 1 and 2 active.

#### 17.7.2 Plan Diversion Rule Table

The System then uses the *state* selected to determine which plan should be implemented in the sub-area nominated for this diversion. For each *state* 3 plans are specified - one for the AM peak, one for the PM peak and the other for all other times.

#### 17.7.3 Diversion Day Sectors Data

For each day of the week this allows different AM peak, PM peak and hence Off-peak times to be specified. The start and times of each peak are entered and the System determines the Off-peak period from this.

#### 17.7.4 Diversion Plan Delay Switching Timetables

This is used to select a delay to be used when starting or stopping a plan. It uses the new *state* and the data is specified in 30-second intervals. It is considered in Beresford St Marcus that there is little point in delaying the introduction of a plan, but because of traffic between the sign and junctions it is sensible to delay the removal by around 1 minute.

# <span id="page-31-0"></span>**18. DIVERSION SIGNS**

#### <span id="page-31-1"></span>**18.1 Introduction**

There are four diversion signs in Beresford St Marcus associated with diversions, V11111, V11112, V11121 and V11122. As their SCNs suggest they are associated with three OTUs and occupy a single control and reply bit.

## <span id="page-31-2"></span>**18.2 Essential Signs**

Because of the nature of the road layout in Beresford St Marcus the failure of one sign does not stop a diversion being implemented. Hence no signs are marked as essential.

# <span id="page-31-3"></span>**18.3 Delayed Cancel Time**

The signs associated with the lifting bridge are required to continue to operate for one minute after the bridge is lowered. In order to achieve this the "Diversions Sign Group Number" is set to 1 and the delay for the diversions to 0.5 minutes.

# <span id="page-32-0"></span>**19. ANALOGUE ENVIRONMENTAL SENSORS**

#### <span id="page-32-1"></span>**19.1 Introduction**

The Analogue Sensors measure levels of pollution at strategic locations in Beresford St. Marcus. Analogue environmental measurements are detected at each sensor and converted to digital data before being transmitted to the UTC system. The UTC system calibrates the data into corresponding units, such as parts per million, which are then available for display on the MMI screen and also stored for future reference.

Five sensors are located at each site, measuring the following information:

- Sulphur Dioxide  $(SO<sub>2</sub>)$
- Nitrogen Dioxide  $(NO<sub>2</sub>)$
- Status Information (Dummy) Channel
- Carbon Monoxide (CO)
- Temperature  $(^{\circ}C)$

As a convention in the Beresford St. Marcus system the last digit of the SCN is standardised, so that:

W11111, W11121, W21111 and W31111 are all Sulphur Dioxide sensors.

In a similar fashion, sensors having 2 as the last digit measure Nitrogen Dioxide, 3 are the Status Channels, 4 are for Carbon Monoxide and 5 measure temperature.

Each sensor has two thresholds associated with it, so that when the Alarm On level is reached an alarm is triggered for that sensor. Similarly, when the Alarm Off level is reached the alarm is cleared.

All the Sulphur Dioxide sensors and the two CO sensors W21114 and W11124 are joined together in a sensor group such that when the measured levels from all these pass their respective Alarm On thresholds a CAST is triggered. This CAST modifies SCOOT parameters and implements diversion signs to reduce the number of vehicles flowing into the city. When the measured levels of all the sensors in the group pass their Alarm Off levels a second CAST is triggered to restore the traffic parameters to their previous values.

#### <span id="page-32-2"></span>**19.2 Identifier**

An analogue sensor is identified by the letter "W" followed by a five digit number.

# <span id="page-33-0"></span>**20. REMOTE REQUESTS**

#### **20.1 Introduction**

Remote requests are used to inform the system of an event and/or to implement automatically:

- <span id="page-33-1"></span>(a) a diversion
- (b) green wave
- (c) the raising of a bridge
- (d) the raising of a bridge and a diversion request
- <span id="page-33-2"></span>(e) implementing solar override on a sub-area when fog is detected.

A user defined remote request may be used to put an entry in the system log when a remote request bit is set, and a different message when the remote request bit is cleared.

#### **20.2 Identifier**

Remote requests are addressed in the system by the letter "Z" followed by five digits. In Beresford St Marcus there are four remote requests designated in the system. The first three are all requesting Green Waves from the fire station Green Wave box. The fourth is derived from the Carter Crossing lifting Bridge. When the bridge is raised, this returns a bit on the OTU X11110, which informs the operator that the bridge is raised and implements diversion U11111.

The low-lying areas around Gotch Graveyard are prone to fog and a fog detector is installed near Bodger Bridge. This fog detector raises a remote request (Z11131) that causes the solar override to be sent to those controllers equipped with an SB bit in subarea 21.

The local authority wishes to have a record of the opening and closing of the Gotch Graveyard access gates. A suitable microswitch has been installed which is connected to the OTU at the Nash/Anderson intersection, to activate a user defined remote request.

# <span id="page-34-0"></span>**21. AUTOMATIC PLAN SELECTION (APS)**

# <span id="page-34-1"></span>**21.1 Introduction**

The County Engineer has yet to be convinced that SCOOT can successfully operate around the Bodger Bridge where the tidal flow system operates. Accordingly he wants a number of fixed time plans to be selected depending upon the status of the three count detectors and one queue detector already available. These are D21111 heading south on Nash Terrace, D21112 heading west, D11141 heading south on Clarke Quay and O11121 located between the two junctions at the west of Bodger Bridge.

If all the count detectors have vehicle counts above their trigger threshold then plan 20 is selected in sub-area 11; if the occupancy level of the detector D21111 is above its threshold then plan 21 is selected. If detector Q11121 shows a queue then plan 22 is selected. If the count and occupancy detectors have triggered then plan 23 is selected. Because of the short link between the two junctions plan 22 is the highest priority.

# <span id="page-34-2"></span>**21.2 The Groups**

APS is driven by the state of three groups. These are the count, queue and occupancy groups referred to in the database as V, Q and O respectively. Each group can consist of up to five detectors. The group's state is determined from either:

a) any of the group triggering, or

<span id="page-34-3"></span>b) all of the group triggering.

The latter is the default action.

# **21.3 Priorities and Plan numbers**

As described above, of the four possible plans, plan 22 has the highest priority and occupies number 4 priority slot, followed by plans 23, 21 and 20.

# <span id="page-34-4"></span>**21.4 Plan Masks**

Each mask is associated with a priority; it makes sense to start with the easiest first. Priority 4 occurs when the queue group triggers, so it is simply "Q". Priority 1 occurs when the count (volume) group triggers, so it is simply "V". Priority 2 occurs when the occupancy group triggers, which is "O". The last trigger occurs when both count (volume) and occupancy group triggers "V.O", that is priority 3.

# <span id="page-35-0"></span>**22. WALL MAPS**

#### <span id="page-35-1"></span>**22.1 Introduction**

Beresford St Marcus has a wall map with each item of equipment including the diversions and green waves shown by LED indications. The operation of each digital output to the wall map is defined in the System Handbook for an STC UTC system. To summarise, each piece of equipment has the following number of bits allocated to it:



# <span id="page-35-2"></span>**22.2 Telecommand 8 systems**

The number of bits for each equipment are allocated to a wall map word number and a starting bit position. There are a total of 128 wall map words available each with 8 bits. There are no rules as to the position of each piece of equipment, different items can be mixed on the same word. One piece of equipment can also cover two adjacent words. i.e. J11111 may start on wall map word number 1 bit position 7 and finish on wall map word number 2 on bit position 1.

On the Telecommand 8 highway the digital I/O chassis that drive the wall map are in positions 0 or 4.

# <span id="page-35-3"></span>**22.3 TC 12 systems**

With TC 12 digital I/O there are 128 words each of 16 bits. The digital I/O rack can be in position 0, 1 or 2.

A TC 12 PC can support two digital I/O racks.
## **23. SYSTEM WIDE VARIANTS**

#### **23.1 Introduction**

Each customer can set up tolerances for controller and transmission checks and file life times for their particular system. The system is supplied with standard defaults. It is not necessary for a new customer to produce a data configuration for this screen.

## **24. SCOOT AREA**

#### **24.1 Introduction**

Before entering SCOOT data it is recommended that the engineer should read the SCOOT User Guide. The area data defines a number of strategic parameters that apply to the whole SCOOT network.

## **25. SCOOT REGIONS**

#### **25.1 Introduction**

The Beresford St Marcus network is to be divided into two regions. A region is a group of nodes that are operated under SCOOT control at the same common cycle time. Normally these are nodes where co-ordination is desirable between them. At this stage it is only necessary to get the basic configuration of the SCOOT database correct as there will undoubtedly be changes during validation and fine tuning. Facilities such as congestion links, gating and SOFT need not be set up at this stage. It is sufficient to leave these areas blank on the data forms.

#### **25.2 Identifier**

A region is identified by the letter "R" followed by any two letters.

#### **25.3 RBB**

This region consists of the three nodes around Bodger Bridge. This area is also to be configured for Automatic Plan Selection.

#### **25.4 RDD**

The rest of the network with the exception of P31111 is placed in region DD. P31111 is not to be placed under SCOOT control and operates on fixed time plans at certain times of the day.

### **26. SCOOT NODES**

#### **26.1 Introduction**

A node is a junction or pelican (pedestrian crossing) under control in the SCOOT network. Junctions and/or Pelicans that are close together may be operated as one node.

#### **26.2 Identifier**

A node is identified by the letter "N" followed by a five digit number.

#### **26.3 N11111**

This is a 2-stage SCOOT node containing the equipment J11111. Unless the node is a multi node containing more than one equipment it should always carry the same number as the equipment to avoid confusion.

The node contains four links, one of which, link D, is a wide three-lane approach and consequently has two SCOOT detectors N11111D1 and N11111D2.

The engineer can choose to define the cyclic fixed time or leave it as 0, in which case the model would calculate its own cyclic fixed time. The normal cyclic fixed time for this node would be 14 (sum of the intergreens -2).

#### **26.4 N11113 and N31131**

These nodes are pelicans P11113 and P31131. Pelicans are modelled differently from junctions. A link into a pelican starts green at:

End of green on vehicle stage (losing GX bit)

+ Fixed length of pedestrian stage (SCOOT min stage length)

+Link start lag.

A link into a pelican ends green at:

End of green on vehicle stage (losing GX bit)

+ link end lag.

Currently it is recommended that the minimum stage length is the time from the start of amber leaving to the start of the flashing amber to traffic. The start lag is then the amount of time before the vehicles start to move. The start lag on pelicans does not contain the fixed five seconds intergreen that junction links have. The cyclic fixed time would then be the same as the SCOOT minimum stage length for pedestrians.

The SCOOT minimum stage length for the vehicle stage is made up of the time from the start of the flashing amber to the expiry of the vehicle minimum green.

#### **26.5 N11141**

This node has four SCOOT stages with stage 2 being a removable SCOOT stage. The SCOOT stages mirror exactly the UTC stages. During the evening peak the right turn flow into Dickinson Drive is very low. Consequently the right turn filter arrow is not used. The translation plan for this time of day omits SCOOT stage 2 and UTC stage B.

The filter link N11141K uses the same detector as N31131F, which is the normal link for the pelican N31131.

The detector for link N11141D is only 60 metres from the stop line. This is because of the large inflow from Maile Mews. This link is adequate for split optimisation but poor for congestion. Therefore an extra detector N11141X1 has been sited in Maile Mews. This is used as the congestion link for N11141D.

#### **26.6 N11121**

This is a multi node formed of two junctions J11121 and J11122. As the distance between the two junctions is only 50 metres, it would be difficult to site loops between them. Because of the short distance the linking is critical and a fixed offset for all times of the day is desirable. The SCOOT stages are almost the same as the UTC stages with the exception that when SCOOT stage 2 starts, UTC A at J11122 is allowed to continue for a further five seconds to clear the Westbound traffic between the two junctions. This allows the right turn from J11121, which runs in UTC stage C, an empty road to turn into.

The SCOOT translation plan for this node looks like this:



Note on J11122, SCOOT stage 2 continues to send UTC A from time 30 until time 35 to maintain a clearance. When calculating the SCOOT minimum stage lengths it is important to add five seconds to stage 2 to accommodate this extra time. The SCOOT stage minimum for each stage is the highest of the UTC stage or stages that run during that SCOOT stage.

#### **26.7 N21111**

This is a 3-stage UTC junction but a 2-stage SCOOT node.

During the morning and off peak the junction operates UTC A and UTC B. During the evening peak the right turn from Nash Terrace is banned and the Junction operates UTC A and UTC C. The only difference in these stages is the indication shown to the motorists in Nash Terrace. In SCOOT terms they are identical and have the same minimum stage lengths. Therefore they are both connected to SCOOT stage 2.

## **27. SCOOT STAGES**

#### **27.1 Introduction**

SCOOT stages are used as the means of defining the different stage movements in the cycle. In simple cases, SCOOT stages directly relate to UTC stages. In more complicated scenarios, several UTC stages may be combined to form a single SCOOT stage. This combination is achieved in the SCOOT translation plan; see the section on junctions for examples.

#### **27.2 Identifier**

Stages are identified by the node SCN plus a "/" and a digit, e.g. N11111/2 is stage 2 on node N11111.

## **28. SCOOT LINKS**

#### **28.1 Introduction**

A link is a traffic movement into a stop line. A link may run through a number of stages. There are five different types of link:

#### **28.2 Identifier**

A SCOOT link is addressed in the system by the node number followed by the link letter, i.e. N11111 link A is addressed as N11111A etc.

(a)An entry link (E) is an input of traffic from outside the network.

- (b)A normal link (N) is a movement of traffic that is fed from another node.
- (c)A filter link (F) is normally used for right turn overlaps, where it is impossible to site the detector in an upstream position. The loop is then positioned in an historic downstream position beyond the stopline. This loop could also be a detector for another downstream link into the next junction.
- (d)An exit link  $(X)$  is used on the exit from the network where exit blocking is likely to occur.
- (e)An uncontrolled link (U) is for the purpose of data gathering. It does not influence SCOOT operation.

## **29. SCOOT DETECTORS**

#### **29.1 Introduction**

Every stop line in the network should have one or more detectors determining the flow arriving or discharging from the stop line. In the case of an entry or normal link the detector is upstream of the stop line. In the case of a filter link the detector is situated in front of the stop line.

#### **29.2 Identifier**

A SCOOT detector is addressed in the system by the node and link number followed by the detector number for the link, i.e. the first detector on N11111A is designated N11111A1 the second as N11111A2 and so on.

[Figure 3](#page-49-0) shows the positioning and designations of the detectors within Beresford St Marcus.

### **30. TIMETABLES**

#### **30.1 Introduction**

At initial set up it is not necessary for a new customer to set up SCOOT events in the timetable. The system works fixed time initially and each sub-area needs a suite of fixed time plans to be used throughout the traffic day. Some users choose not to have any fixed time plans and operate entirely on SCOOT and/or local control. Beresford St Marcus uses six fixed time plans, three of which are implemented through the automatic plan selection system. The Monday through Friday timetable looks something like this:



Information on typical SCOOT events for a timetable can be found in the SCOOT User Guide within the chapter on Customising.

## **31. CASTS**

#### **31.1 Introduction**

A CAST is a group of commands that are stored and can be actioned together, either by operator or timetable command. By having a number of CASTs throughout the timetable in this way, it is very simple to add or delete events from a CAST without the need to modify the timetable. It also simplifies the timetable listing considerably as shown below.



The CASTS can be allocated names using the NCAS command, e.g.

CAST number 10 that is actioned at 03:00 could be named as "Reset car park vehicle counts" CAST number 1 that is actioned at 06:30 could be named as "AM Peak".

CAST number 3 that is actioned at 18:30 could be named as "PM peak end".

## **Appendix A - The layout of Beresford St Marcus**



### **Beresford St. Marcus**

**Figure 1 - Town Plan**



**Figure 2 - Plan of OTU Allocation**

<span id="page-49-0"></span>

**Figure 3 - Plan of SCOOT Network**

## **Appendix B - Junction Stage Diagrams and Timings**



**Stage Min Max Intergreen Table from stage 1 34 2 1 2 3 4 Lower Timings 7 20 X 9 10 27 7 X**







**Intergreen Table from stage**









**4**











**1**

**2**

**3**

**4**



**Intergreen Table**

**from stage**



**Figure 6 - J11122**







**Intergreen Table**







**Lower Timings**



**1**

**2**

**3**

**4**

**Intergreen Table from stage**







## **Appendix C - Completed Data Forms for Beresford St Marcus**



UTCDP01 - 18/06/97 - SJN



LITCDPoe - 09/09/96



UTCDPp3A - 27XB/B1



UTCDPDOC-SARROT - DTA



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UTCDP00D-30/03/01 - DTA



UTCDP00D-SMC301 - DTA



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**LTTC19900-3000001 - DTA** 



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UTTDOPPORD-SOVICIBIO1 - DTA

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UTCDP000-3003001-DTA



UTCDP60D-30/03/01 - 0TA





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UTCOP65-27/03/01

Siemens Traffic Controls Limited






UTCDP05-27/03/01





UTCDP06 - 26/09/96



UTCDP06-26/09/96



UTC/DP06 - 26/09/98



UTCDPD6 - 26/09/96



UTCDP08 - 26/09/98



UTCDP07 - 27/0a/01





UTCDP09-28/03/01



UTCDP09 - 28/03/01



UTCDP09 - 28/08/01



UTCDP08 - 28/03/01



UTODP09-28/09/01



UTCDP09-28/03/01



UTCOP10-25/09/96

l,

Siemens Traffic Controls Limited **UTC DATA PREPARATION** SYSTEM: DATE: **FORM: SPECIAL FACILITY DATA**  $F = 3$  (1) 32 Special Facility SCN (ω)Α(V)∈) | (R(ο) α(τ(€) | (2) Location Type (1/2) RR Bit Present (Y/N) **Oustation SCN**  $300\times 30$ Outstation Data Word f. Confirm Bit Present (Y/N) Outstation Bit Position (0-15) ಿತ Link List Number (0-99) Link List Master? (Y/N) Type 2 (Enable by Plan) Special Facilities Junction/Pelican (J/P) SCN  $\pm$  100  $\pm$ Enable by Plan Enable by Translation Plan

UTCDP10 - 25/09/96



LITCDP10 - 25/09/96



UTODP11-25/09/96



UTCOP12 - 26/03/01



UTCDP12-28/03/01



UTCDP12-28/03/01



UTCDP12 - 28/03/01

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UTCDP12A - 02/04/01



0100P12B-29/03/01-DTA











UTCDP13 - 02/04/01 - DTA





UTCDP14 - 28/09/01- DTA



UTCDP14 - 28/08/01- DTA



UTCDP14 - 28/08/01- DTA



UTCDP14 - 28/03/01- DTA



UTCDP14-28/02/01-DTA














LITCDP18 -26/09/86 - DTA







UTCDP20 - 26/08/96 - DTA



UTCDP21-26/09/96 - DTA











UTOSENS - 28/03/01



UTCSENS - 28/03/01





UTCSENS - 28/03/01











UTOSENS - 28/09/01









UTC-SENS - 28/03/01









UTCSENS - 28/03/01



Siemens Traffic Controls Limited



TC12 Wall Mep - 26/09/98



UTCDP24 - 02/04/01

Slemens Tratfic Controls Limited



\$1,8000T Area - 28/03/01 - DTA





S3:SCOOT Node - 28/03/01 - DTA

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 $\frac{d}{dt} \sum_{i=1}^{n} \frac{d}{dt} \left( \frac{d}{dt} \right) \left( \frac{d}{dt} \right)$ 





S3:SCOOT Node - 28/03/01 - DTA


\$3:\$COOT Nade - 28/03/01 - DTA



\$3:\$COOT Nade - 28/03/01 - DTA





S4:SCOOT Stage - 26/03/01 - DTA







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\$4:SCOUT Slags - 28/03/01 - DTA



Note: \* This field is the "Sub-Area / Node ID" from form SCOOT NODE DATA

SS/G:SCOOT Link/ Link Stage - 28/03/01 - SJN



\* This lield is the "Sub-Area / Node ID" from form SCOOT NODE DATA Note;

S5/6:SCOOT LINV Link Stage - 28/03/01 - SJPP

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Note: " This field is the "Sub-Area / Node ID" from form SCOOT NODE DATA

\$5/6;SCOOT Link/ Link Stage - 28/03/01 - SJN

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Note: \* This field is the "Sub-Area / Node ID" from form SCOOT NODE DATA

\$5/8:SCOOT Link/ Link Stage - 28/03/01 - SJN

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Note: \* This field is the "Sub-Area / Node ID" from form SCOOT NODE DATA

S5/6:SCOOT Link/ Link Stage - 28/03/01 - SJN



\* This field is the "Sub-Area / Node ID" from form SCOOT NODE DATA Note:

SS/S/SC/00T Univ Link Stage - 28/03/01 - SJN



\* This field is the "Sub-Area / Node ID" from form SCOOT NODE DATA Note:

55/6:SCOOT Link/ Link Stage - 28/03/01 - \$JN



Note: \* This field is the "Sub-Area / Node ID" from form SCOOT NODE DATA

SS/6:SCOOT Link/ Link Stage - 28/08/01 - \$JN



Note: \* This field is the 'Sub-Area / Node ID' from form SCOOT NODE DATA

SS/B:SCOOT Link/ Link Stage - 2B/03/01 - S3N



\* This field is the "Sub-Area / Node ID" from form SCOOT NODE DATA Note:

SS/B:SCOOT Link/ Link Stage - 28/03/01 - SJN



Note: \* This field is the "Sub-Area / Node ID" from form SCOOT NODE DATA

\$5/6:9000 TLInk/ Link Stage - 28/03/01 - SJN



\* This field is the "Sub-Area / Node ID" from form SCOOT NODE DATA Note:

SS/6-SCOOT TING TINK Stage - 28/03/01 - SJN

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Note: \* This field is the 'Sub-Area / Node (D" from form SCOOT NODE DATA

S\$6:SCOOT Driv Link Stage - 28/03/01 - SJN



Note: \* This field is the "Sub-Area / Node ID" from form SCOOT NODE DATA

S5/0:SCOOT Link/ Unk Stage - 28/03/01 - SJN

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Note: \* This field is the "Sub-Area / Node ID" from form SCOOT NODE DATA

S5/6:SCOOT Link/ Link Stage - 28/03/01 - SJN

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Note: \* This field is the "Sub-Area / Node ID" from form SCOOT NODE DATA

\$5/6:SCOOT Link/ Link Stage - 28/03/01 - SJN



Note: \* This field is the "Sub-Area / Node ID" from form SCOOT NODE DATA

S5/8:SCODT Linx/ Link Stage - 28/03/01 - SJN



Note: \* This field is the "Sub-Area / Node ID" from form SCOOT NODE DATA

S5/8:SCOOT Link/ Link Stage - 28/03/01 - SJN



Note: \* This field is the "Sub-Area / Node ID" from form SCOOT NODE DATA

SS/8:SCOOT Link/ Link Stage - 28/03/01 - SJN



Note: \* This field is the "Sub-Area / Node ID" from form SCOOT NODE DATA

S5/6/SCOOT Link/ Link Stage - 28/03/01 - Sth:

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S7:SCODT Datector - 29/03/01 - DTA











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## **Appendix D - Blank Data Forms**

The following pages allow you to prepare data required by the UTC System prior to data entry. You are only allowed to make sufficient copies for this purpose.

Siemens Traffic Controls



UTCDP01 - 19/06/97 - SJN

Siemens Traffic Controls



#### **Notes:**

SUB-AREA : Between 01 and 99

DESCRIPTION : Any readable characters are allowed. PCSCN : Only for systems with Telecommand 12 COMPUTER : Leave this column blank for single computer systems

UTCDP02 - 09/09/96



UTCDP03A - 27/03/01

SiemensTraffic Controls



#### **Notes:**

Location : Any readable characters are allowed \* OTUs are normally set to "valid".

UTCDP03 - 09/09/96

Siem ens Traffic Controls



UTCDP00B - 06/10/94 - DTA

Siemens Traffic Controls



UTCDP00D-30/03/01 - DTA

Data Preparation Guide for an STC UTC System 666/HH/16940/000 Siemens Traffic Controls







UTCDP04A – 21/8/03 JRHA

Siemens Traffic Controls





UTCDP06 - 26/09/96

Siemens Traffic Controls



UTCDP15 -28/03/01 - DTA

Siemens Traffic Controls



UTCDP07 - 27/03/01



UTCDP09 - 28/03/01

Siemens Traffic Controls



UTCDP08 - 02/04/01

Siemens Traffic Controls



UTCDP10 - 25/09/96

Siemens Traffic Controls



UTCDP11- 25/09/96

Siemens Traffic Controls



UTCDP13 - 02/04/01 - DTA

Siemens Traffic Controls



UTCDP14 - 28/03/01- DTA

Siemens Traffic Controls



UTCSENS - 28/03/01

Siemens Traffic Controls UTC DATA PREPARATION | SYSTEM :  $||$  DATE: **FORM : ANALOGUE SENSOR GROUP DEFINITIONS** Traffic Control Computer TCCAnalogue Sensor Group | : : | Analogue Sensor SCN  $\mathcal{L}$ **W**  $\pm$   $\pm$ **W**  $\ddot{\phantom{a}}$  $\mathbf{r}$ **W**  $\frac{1}{2}$  $\frac{1}{2}$ **W** ŀ **W** j  $\cdot$ **W W W W**  $\ddot{\phantom{a}}$ **W W** ÷,  $\mathcal{L}_{\mathbf{r}}$  $\sim$ **W**

UTCSENSG - 13/08/97


UTCDP17 - 02/04/01 - DTA



UTCDP17A - 30/03/01 - RSD



UTCDP18 -26/09/96 - DTA



UTCDP17B - 30/03/01 - RSD



UTCDP19 - 26/09/96 - DTA

Siemens Traffic Controls



## **Note:**

Time starts and ends should be entered in the 24-hour format, suppressing the hour:minute divisor.

e.g. time "10:23" sould be entered as "1023"



UTCDP21 - 26/09/96 - DTA



UTCDP22 - 26/09/96 - DTA



UTCDP12 - 28/03/01



UTCDP12B - 29/03/01 - DTA

Siemens Traffic Controls UTC DATA PREPARATION  $\begin{bmatrix} \end{bmatrix}$  SYSTEM :  $\begin{bmatrix} \end{bmatrix}$  DATE: **FORM : REMOTE REQUEST FOG DETECTION DATA** Remote Request SCN ..........Z 计小字 111111111111111 Description .............................. Outstation SCN .....................X 生活生活 Reply Bit Position (0-15).......... Outstation Data Word……....... Fog Detection Delay (1-60)...... Fog Clearance Delay (1-60)..... Subareas affected.....................

UTCDP12A - 02/04/01



UTCDP16 - 28/03/01 - DTA



TC12 Wall Map - 26/09/96



UTCDP23 -29/03/01 - DTA



UTCDP24 - 02/04/01



UTCOMU - 26/09/96



S1AREA 09/11/01 JRHA



S2:SCOOT Region - 28/03/01 - DTA





Siemens Traffic Controls



**Note:** \* This field is the "Sub-Area / Node ID" from form SCOOT NODE DATA

S5/6:SCOOT Link/ Link Stage - 28/03/01 - SJN



S7:SCOOT Detector - 29/03/01 - DTA