Siemens Mobility and Logistics, Traffic Solutions
Sopers Lane
Poole
Dorset
BH17 7ER

SYSTEM/PROJECT/PRODUCT: GEMINI^2 Traffic Outstation

SIEMENS

GEMINI^2

TRAFFIC OUTSTATION

HANDBOOK

Prepared: Paul Cox Eric Burdis Jim Ballantine Mark Retallack

Function: Traffic Engineering

THIS DOCUMENT IS ELECTRONICALLY HELD AND APPROVED

Issue	Change Ref.	Date
9	TS005647	29-November-2010
10	TS006234	09-November-2011
11	TS006588	09-July-2012
12	TS007714	14-Oct-2014
13	TS007811	10-Dec-2014

SAFETY WARNINGS

In the interests of health and safety, when using or servicing this equipment, the following instructions must be noted and adhered to:

(i) Only Skilled or Instructed personnel with relevant technical knowledge and experience, who are also familiar with the safety procedures required when dealing with modern electrical or electronic equipment, are to be allowed to use and/or work on the equipment. All work shall be performed in accordance with the Electricity at work Regulations 1989 and the relevant Highways Agency (DoT) procedures of test and maintenance.

(ii) Such personnel must take heed of all relevant notes, cautions and warnings in this handbook, and any other documents and handbook associated with the equipment including, but not restricted to, the following:

   (a) The equipment must be correctly connected to the specified incoming power supply.

   (b) The equipment must be disconnected/isolated from the incoming power supply before removing protective covers or working on any part from which protective covers have been removed.

   (c) The equipment contains batteries that must be disposed of in a safe manner. If in doubt of the correct procedure, refer to the Siemens instructions.

Maintenance Provision (MP)

1. Product Reference

Siemens GEMINI^2 Traffic Outstation

2. Specifications

The GEMINI^2 Traffic Outstation is designed to meet the following Highways Agency specifications:

MCE 0152	Monitoring and Control of Traffic Equipment via the Public Switched Telephone Network.
MCE 0153	Functional Specification for the Monitoring and Control of Variable Message Signs on Roads Other Than Motorways
TR 2130, Issue C, Feb 2002	Environmental tests for motorway communications equipment and portable and permanent road traffic control equipment

3. Installation and Commissioning

Methods of Installation and Commissioning are detailed in the Siemens Traffic Controls document:

667/HB/32600/000 GEMINI^2 Traffic Outstation Handbook.

For Graphos, these methods are detailed in document 667/HB/31200/000 Graphos Product Handbook (Section 14 – Commissioning).

4. Spares and Maintenance

All maintenance and repairs should be carried out in accordance with the Siemens Traffic Controls document:

667/HB/32600/000 GEMINI^2 Traffic Outstation Handbook.

For Graphos, see documents

667/HB/31200/000 Graphos Product Handbook, and
667/HE/31200/000 Fault Finding and Troubleshooting Guide.

5. Modifications

There are no approved modifications, with the exception of those listed in the following Siemens Traffic Controls Document:

667/HB/32600/000 GEMINI^2 Traffic Outstation Handbook

6. Warning

Use of components other than those permitted above or modifications or enhancements that have not been authorised by Siemens Traffic Controls may invalidate Type Approval of this product.

MP 15/04/2003 Issue 1

CONTENTS

TABLE OF FIGURES

1. INTRODUCTION

1.1 PURPOSE

This document is intended to provide sufficient information to the user to install, configure and maintain the GEMINI^2 Traffic Outstation, either as a Siemens RMS OMCU, a Bus Processor, a Siemens MOVA unit, a SieClass (Vehicle Classifier) unit, a UTMC OTU, a VMS unit or a Graphos unit.

The GEMINI^2 Traffic Outstation is based on the original GEMINI Traffic Outstation with an upgraded processor card containing additional memory. The GEMINI^2 Traffic Outstation provides additional functionality in terms of dual-stream MOVA 5 and future expansion capability. See section 2.2.1 for additional information.

1.2 SCOPE

This document covers the Siemens OMCU, Bus Processor, MOVA, SieClass, UTMC OTU and UTMC VMS units.

This document does not include any details about:

(a) MOVA strategy or how to generate the MOVA configuration. For details about MOVA strategy and for more information about the operation of the MOVA unit, refer to the MOVA documents listed below.

(b) The Graphos equipment or how to set up the Graphos configuration. For more information about the operation of the Graphos unit, refer to the Graphos documents listed below.

1.3 RELATED DOCUMENTS

GEMINI Traffic Outstation Handbook..667/HB/30600/000
RMS Instation Users Handbook...667/HB/26131/000
RMS DUSC Users Handbook 667/HB/26131/100
TC12 Installation, Commissioning and Maintenance Handbook .. 667/HE/43100/000
Installation, Commissioning of GPRS Siespace Systems 667/HE/30707/000
Monitoring and Control of Traffic control equipment via the PSTN..............MCE 0152
Monitoring and Control of Variable Message Signs on Roads other than Motorways ....MCE 0153
TRL MOVA Traffic Control Manual...AG10
TRL MOVA Data Set-Up Guide AG11
TRL MOVA Equipment User Guide..AG12
Installation Guide for MOVA (Issue B, December 1999) ....MCH 1542
Graphos Product Handbook...667/HB/31200/000
Fault Finding and Troubleshooting Guide Handbook.....................667/HE/31200/000
IP Router Installation Guide..667/CI/45025/000

Gemini2 RMS to 3G Comms Conversion QS Guide……………….667/CI/32630/000

1.4 ABBREVIATIONS

AC	Alternating Current
CCITT	International Co-ordinating Committee for Telephony and Telegraphy
CLF	Cable-less Linking Facility
CPU	Central Processing Unit
DC	Direct Current
DFM	Detector Fault Monitoring
DUSC	Dial Up Strategic Control
EMC	Electromagnetic Compatibility
FLASH	Non-volatile memory that may be programmed under software control
GPRS	General Packet Radio System
Graphos	Graphical Variable Message Sign / Vehicle Activated Sign
GSM	Global System for Mobile communication
I/O	Input and Output
LAN	Local Area Network
LED	Light Emitting Diode
LMU	Lamp Monitoring Unit
MOVA	Microprocessor Optimised Vehicle Actuation
OEM	Other Electrical Manufacturers
OMU	Outstation Monitoring Unit
OMCU	Outstation Monitoring and Control Unit
OTU	Outstation Transmission Unit
PCB	Printed Circuit Board
PIN	Personal Identification Number
PROM	Programmable Read Only Memory
PSTN	Packet Switched Telephone Network
PSU	Power Supply Unit
RAM	Random Access Memory
RMS	Root Mean Square **or** Remote Monitoring System
RS232	EIA Data Communications Interface - Level based serial communications standard
RS485	EIA Differential Data Communications Interface - Differential serial communications standard
SCOOT	Split, Cycle, Offset, Optimisation Technique
STC	Siemens Traffic Controls
TfL	Traffic for London
TRL	Transport Research Laboratory
UMTS	Universal Mobile telecommunications System
UTC	Urban Traffic Control
UTMC	Universal Traffic Management and Control
UVMS	Urban Variable Message Sign
VC	Vehicle Classification

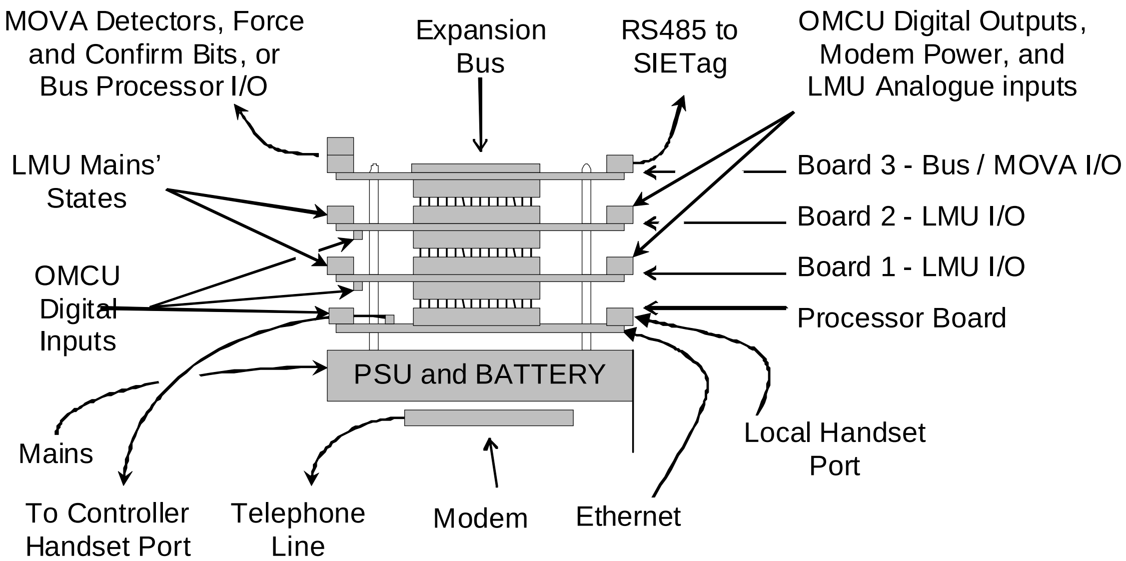
VPN	Virtual Private Network

2. PRODUCT DESCRIPTION

2.1 INTRODUCTION

Figure 1 is an overview of a Siemens GEMINI^2 Traffic Outstation (shown with two LMU I/O boards and a single Bus / MOVA I/O board) and how it connects as a system.

Figure 1 – Overview



Important ***Board 1 must be fitted at the bottom of the stack and where LMU I/O boards and Bus / MOVA I/O boards are required, the LMU I/O boards must be fitted first. However, early versions of the OMCU were arranged with I/O board 1 at the top – no change is required to these units.***

The Siemens GEMINI^2 Traffic Outstation provides a number of different facilities depending on the firmware stored in the FLASH memory:

- RMS OMCU
- DUSC
- Flow
- Occupancy
- OMCU Events and Switch Override
- Siemens TRL MOVA
- Bus Processor applications
- Siemens Vehicle Classifier (SieClass)
- Car Park Count application
- UTMC OTU
- Graphos

The **RMS OMCU** application monitors TR2210 intersection and 'mid-block' (or 'stand-alone') pedestrian controllers and most pre-TR0141/TR2210 traffic controllers.

It reports back faults and status of both the Traffic Controller and the OMCU itself to the Instation. The configuration for the intersection to be monitored is downloaded from the Instation to the OMCU. See section 4.1 for more information on the OMCU application.

The **DUSC** application has the same facilities as the RMS OMCU application, but can also control traffic controllers via timetable events (e.g. introduce a plan at 9am on Monday, and isolate the plan at 6pm on Friday). See section 4.2.9 for more information on the DUSC application.

The **Flow** application can be connected to up to 16 detectors. Each detector can provide flow data over a configured period of time. If the flow data meets the ‘up threshold’, a flow alarm is raised. If the flow data meets the ‘down threshold’, the flow alarm is cleared. Flow data is stored in the ‘Operations Log’, and can be uploaded to the RMS Instation. See section 4.2.10 for more information on the Flow application.

The **Occupancy** application can be connected to up to 16 detectors. Each detector can provide occupancy data over a configured period of time. If the occupancy data meets the’ up threshold’, an occupancy alarm is raised. If the occupancy data meets the ‘down threshold’, the occupancy alarm is cleared. Occupancy data is stored in the ‘Operations Log’, and can be uploaded to the RMS Instation. See section 4.2.11 for more information on the Occupancy application.

There are up to 16 **OMCU Events**, which are inputs to the OMCU and 16 Switch Overrides, which are outputs from the OMCU. The OMCU Events are monitored and when they meet predefined conditions a message is sent to the Instation. The Instation can then make a decision as to whether a new plan and/or switch should be introduced (Switch Overrides). By adjusting plans and/or switches at adjacent traffic junctions the traffic flows within an area can achieve an increased flow capacity. Switch Overrides are activated by the Instation when an OMCU Event has been reported. A Switch Override will remain active for a fixed period of time, or until cancelled by the Instation. See section 4.2.12 for more information on the OMCU Events and Switch Override Facility.

The **Bus Processor** application can be connected to up to 12 SIETAG readers, TfL microwave beacons or a single TfL RTIG radio link. The application provides both logging and access control functions. See section 4.2.5 for more information on the Bus Processor Functions.

The **MOVA** application is a new strategy for control of traffic light signals at isolated junctions. See section 9 for more information on the MOVA application.

The **Car Park** application determines the current occupancy of a car park and sends this to a ‘SIESpace’ Instation over a PAKNET communications interface. This information can then be used by the Instation to guide vehicles to car parks that have spaces. See section 10 for more information on the Car Park application.

The **UTMC OTU** enables second-by-second control of the associated Traffic Controller by the central UTC system, using open-standard protocols. See section

2.2.5 for outline layout, section 4.3.1 for overview, section 5.1.2 for installation pre-requisites and cabling, and section 11 for configuration details.

The **Graphos** application is a new strategy for control of a cluster of Signs (up to 4 signs). See section 4.2.14 for more information on the Graphos application.

All of the applications within a unit (except the Car Park and the Graphos application) can be used simultaneously; limited only by the number of I/O boards that can be accommodated, and by the availability of the appropriate communications to the relevant instation system.

The hardware platform is a self contained unit consisting of a CPU board that is microprocessor based; one or more I/O Boards, the PSU, Battery and optionally a Modem (see Figure 1 overleaf).
Note: Graphos has no I/O boards and uses a different PSU.

Where a Modem is present, it can be connected through a land line to the PSTN or via a GSM 900 digital network. The unit can be communicated with and will report back faults via the PSTN or GSM. When a modem is not present, all Instation functions are available locally via a local RS232 ‘handset’ port. The platform has the facility to share a PSTN connection with other compatible equipment. The GSM version of the unit is available for situations where a PSTN connection is not available or is not cost effective (see sections 2.6.2 and 4.2.9).

The unit is mains powered and is fitted with a battery to support the unit in the event of a mains failure. This allows it to dial the Instation to report the mains failure.

The complete unit fits within a Traffic Controller’s Roadside Cabinet. It is designed to fit within an existing 3U detector rack, in an additionally supplied 3U rack, or directly onto the rack mounting uprights. It can be mounted in an ancillary housing if necessary.

When fully configured it occupies 192mm of a standard 3U rack, and is of a modular design. The boards are interconnected by way of an expansion bus and up to 3 I/O boards may be fitted. The main features of each individual board, assembly and the expansion bus are highlighted in the following sections.

This Unit meets all the Environmental and EMC requirements as specified in MCE 0152A, MCE 0153A and specifications TR2130C and EN50293.

2.2 Siemens GEMINI^2 Traffic Outstation Equipment

2.2.1 The GEMINI^2 Platform

The GEMINI^2 Traffic Outstation is based on the original GEMINI Traffic Outstation with an upgraded processor card containing additional memory and a new version of firmware. The GEMINI^2 Traffic Outstation provides additional functionality in terms of dual-stream MOVA 5 and future expansion capability.

Compatibility
The GEMINI^2 Traffic Outstation is compatible with I/O boards and expansion kits as supplied with the original GEMINI Traffic Outstation.

Identification
The GEMINI^2 Traffic Outstation can be identified by the **Gemini^2** logo on the PSU front panel. In addition, the GEMINI^2 processor board is variant 999, as identified on the right hand portion of the processor board serial number/bar code label
e.g. 999-01 identifies processor board variant 999, issue 1.

Firmware
The GEMINI^2 Traffic Outstation runs a new version of firmware – latest part number 12687. The part number and issue state can be displayed on the handset using the 'PIC' command. The GEMINI^2 Traffic Outstation can run firmware PB684 or PB683 if required.

IMPORTANT: The new GEMINI^2 firmware will not run on the original GEMINI Traffic Outstation.

Top Level Variant Numbering
The GEMINI^2 Outstation top level part numbers are now 667/1/3**2**600/xxx, whereas the original GEMINI Outstation part numbers were 667/1/3**0**600/xxx. The /xxx variant code remains the same, thus the original number 667/1/30600/001 becomes 667/1/32600/001 for GEMINI^2. See section 7.5 for a full list.

Outstation Equipment Options
The Siemens OMCU (667/1/32600/001) together with the associated OMCU cables is capable of monitoring a Traffic controller with up to 16 phases and up to 48 digital inputs. It can also control a number of isolated outputs.

The OMCU normally uses one or more LMU I/O boards each providing up to 10 lamp monitor channels, 16 digital inputs, and 4 digital outputs. An alternative I/O board providing 4 RS485 communication channels, 48 digital inputs and 16 digital outputs may also be fitted. This board is primarily used by the Bus Processor and MOVA applications and thus is known as the Bus / MOVA I/O board.

A number of optional kits are available which, when added to the Basic OMCU, allow connection to any Controller. MOVA and BUS Processing kits are also available. The sections 2.2.2 etc. that follow show the combinations of facilities and the way the components are connected.

It is also possible to upgrade an existing “old style” OMU/MOVA/Bus Processor with a new GEMINI^2 processor card to provide all the new facilities described in this handbook. The installation details for this are described in section 5.8.

2.2.2 Basic OMCU

The PSTN GEMINI^2 Traffic Outstation OMCU (667/1/32600/001) can be used with an ST700 or ST800 Controller. See Figure 2 below for details.

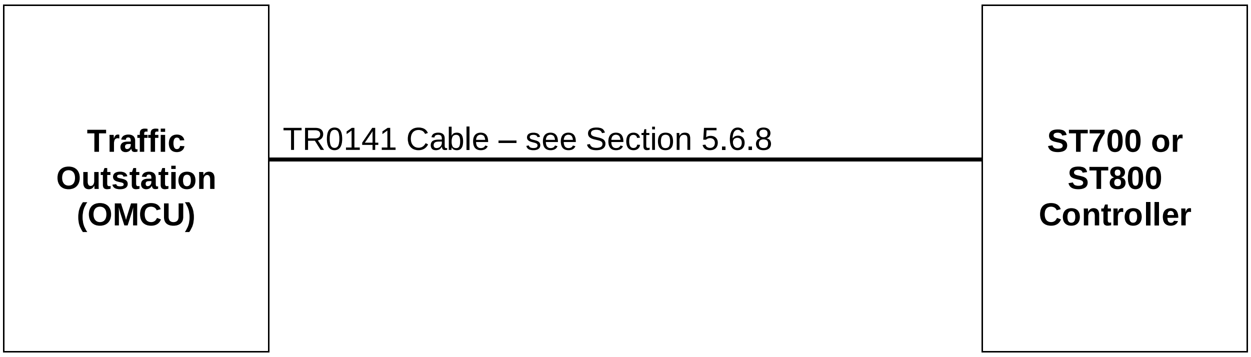


Figure 2 – Basic OMCU to ST700 or ST800

For connection to other Controllers, use the OMCU/LMU I/O Expansion kit (667/1/28853/001). If additional I/O is required, also add the OMCU / LMU I/O Expansion kit (667/1/28853/000).

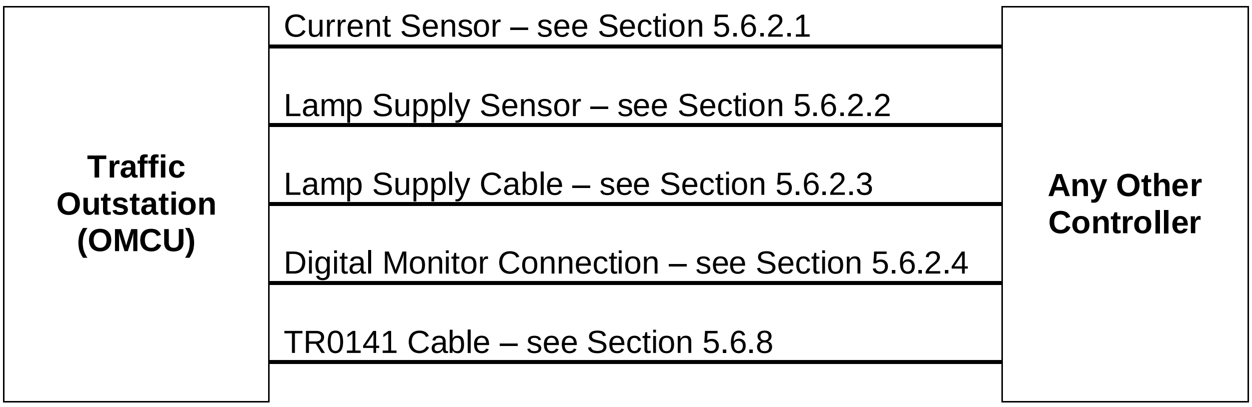


Figure 3 – Basic OMCU to Any Other Controller

2.2.3 MOVA

A standard PSTN GEMINI^2 Traffic Outstation will function as a MOVA unit if the appropriate ‘enable code’ is used.

See Figure 4 below for details of the MOVA connections to an ST700 or ST800 Controller; connections to all other controllers are shown in Figure 5.

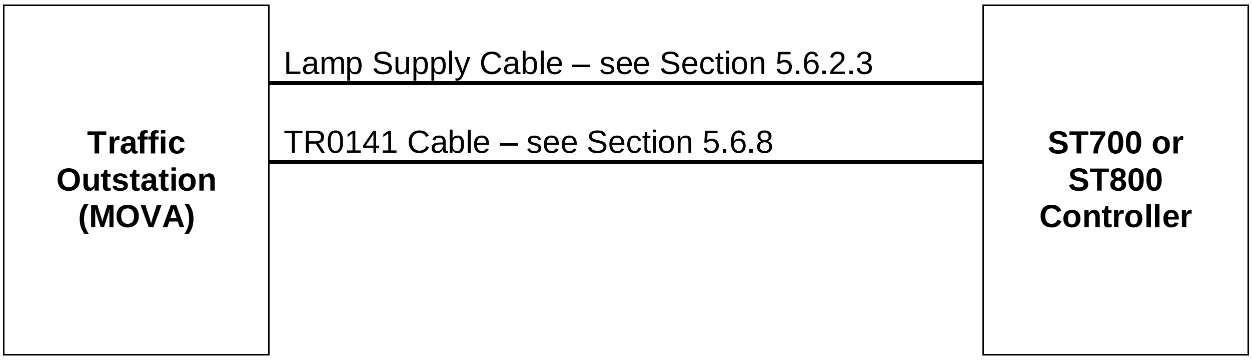


Figure 4 – MOVA to ST700 or ST800

The MOVA unit described in Figure 4 may be used with other types of Controllers by adding the MOVA I/O All Controller kit (667/1/28855/001).

If OMCU functionality is required in addition to MOVA, also add the cable kit(s) described in Figure 3.

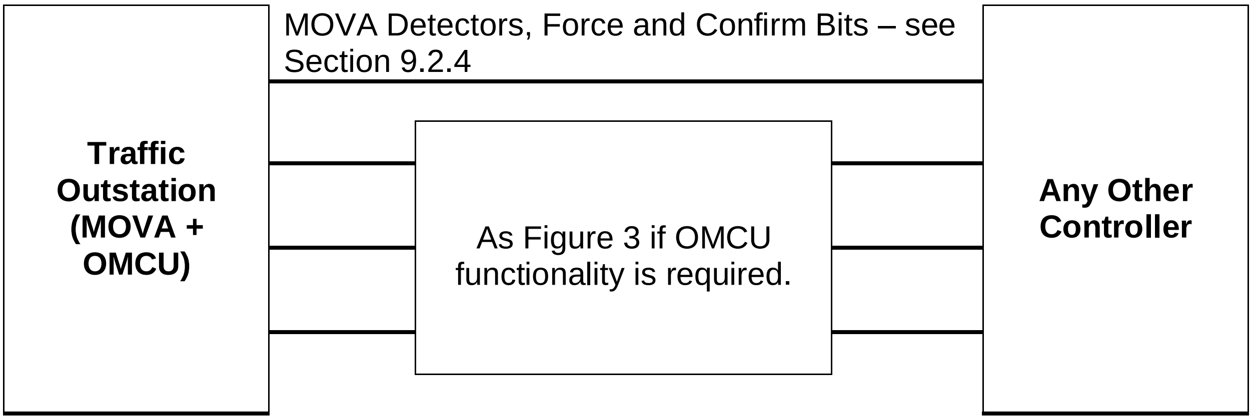


Figure 5 – MOVA to Any Other Controller

2.2.4 Bus Processing

Bus Processing may be performed by adding the Bus / MOVA I/O card and Cable kit (667/1/28856/000) to the GEMINI² Traffic Outstation. If OMCU functionality is also required, also add the cable kit(s) described in Figure 3.

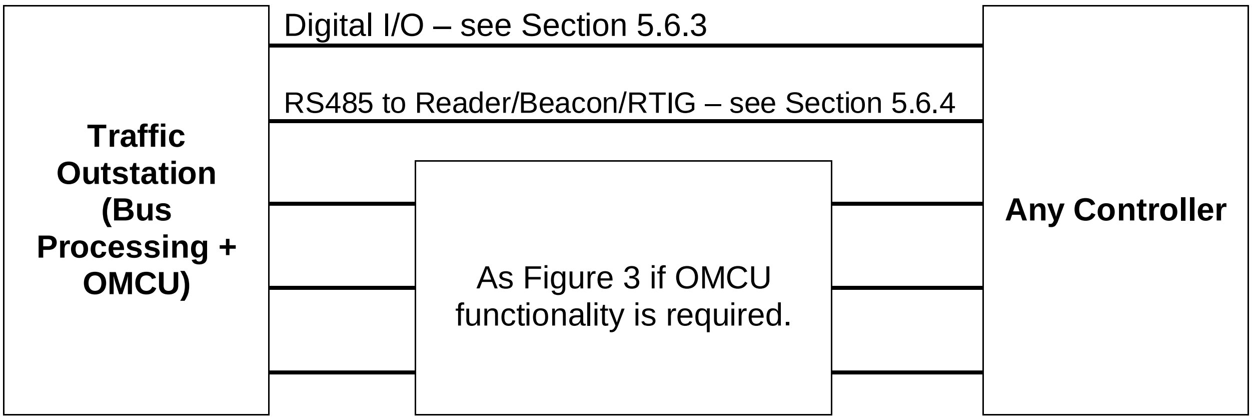


Figure 6 – BUS Processing to Any Controller

2.2.5 UTMC Outstation

A standard GEMINI² Traffic Outstation will function as a UTMC Outstation if the appropriate 'enable code' is used.

See Figure 7 below for details of the UTMC OTU connections to an ST700 or ST800 Controller; connections to all other controllers are shown in Figure 8.

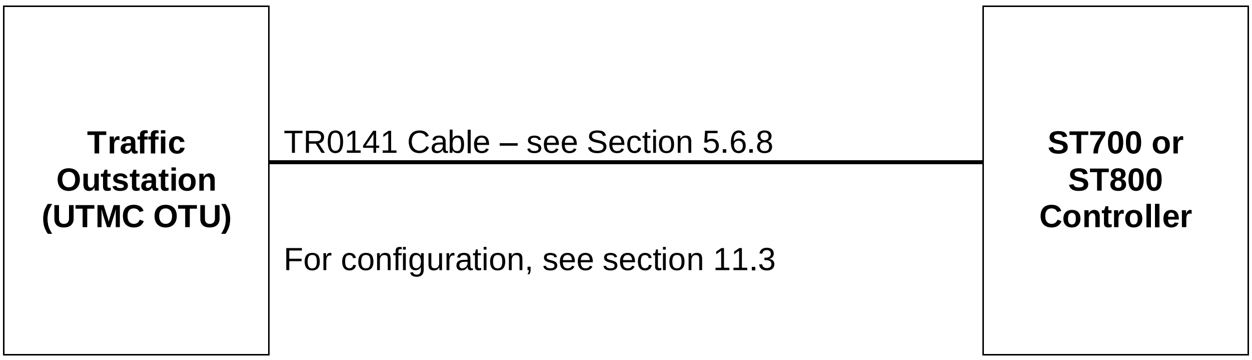


Figure 7 – UTMC OTU to ST700 or ST800

The UTMC Outstation unit described in Figure 7 may be used with other types of Controllers by adding the UTMC O/S Kit (667/1/30625/000).

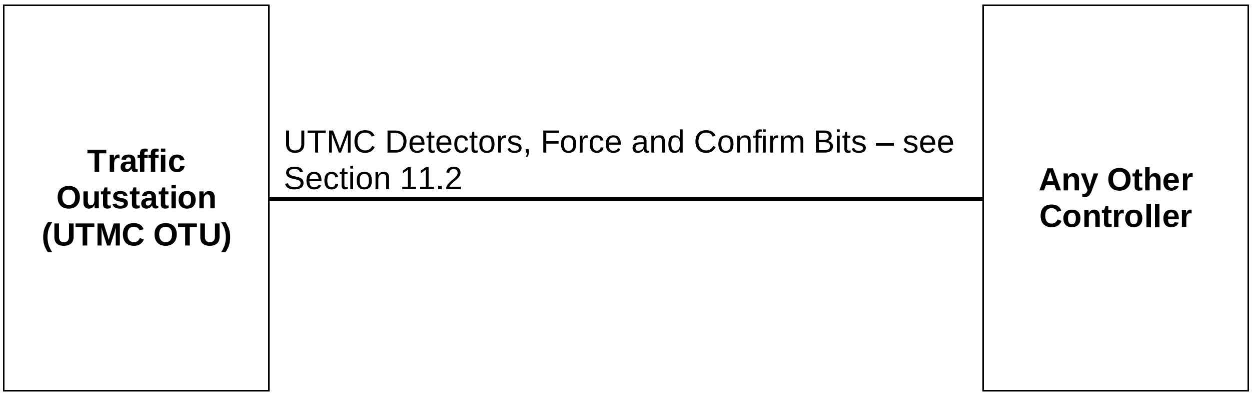


Figure 8 – UTMC OTU to Any Other Controller

2.2.6 Graphos Outstation

The Graphos Outstation consists of only the Gemini^2 CPU Card, the battery and a PSU which is different to the one normally used within a standard GEMINI^2 Traffic Outstation. It will function as a Graphos Outstation if the appropriate 'enable code' is used.

See the Graphos Product Handbook 667/HB/31200/00 for more information.

2.3 PROCESSOR UNIT

This is a 3U 220mm long, 100mm wide and 17mm high extended Eurocard. It is a multi-layer PCB, using mostly surface mount components. It provides the processing power required by the unit. The processor unit is based on Motorola's Power PC range of 32-bit microprocessors (MPC850) with highly sophisticated on-chip peripheral capabilities. This offers much more capability with 'built-in' serial and Ethernet ports.

The board provides the expansion bus that extends the system using one, two or three I/O boards. For details see section 2.8 on page 31.

2.3.1 Processor Unit's Features

(a) Battery backup of the entire RAM (see Section 7.6.3(b) on page 123). For Bus Processor applications this board also provides capacitive support allowing the RAM backup battery to be changed without loss of data.

(b) The Expansion Bus for fast board to board data transfers. The CPU board can address up to 3 I/O boards.

(c) Three programmable RS232 Serial communications Ports:
- Handset Port.
- Traffic controller TR2210 (TR0141) Port.
- Modem Port.

(d) Battery backed-up Real Time Clock. This may be enhanced by the connection of a Radio Clock that synchronises the internal clock with time transmitted by the MSF Rugby transmitter (or optionally by the connection of a GPS receiver to the TR2210 serial port (or RS485 serial port on a Bus / MOVA IO board)).

(e) 'State of the art' FLASH memory for program storage

(f) 'Zero-Cross Over' signal derived from the associated PSU support PCB. Used for a software timing reference, for the mains based monitoring signals.

(g) Power Fail (low voltage inhibit)

(h) Watchdog monitor

(i) Processor error indication

(j) Voltage Regulation (allowing a range of DC input)

(k) Provides power for the modem, with a choice of two different voltages offered.

(l) Status LED indicators (also see section 7.3 which starts on page 118)

(m) Power dissipation less than 100 mW.

2.4 LMU I/O BOARD

This is a 3U 220mm long, 100mm wide and 14mm high extended Eurocard. It is a multi-layer PCB, using mostly surface mount components. When required for OMCU monitoring, up to three LMU I/O boards may be fitted to meet the entire controller's monitoring requirements. I/O boards access the processor board by way of the Expansion Bus; see section 2.8 on page 31 for more details.

This board can also provide the power for the modem, with a choice of three different voltages offered.

This card also provides a 'Zero Cross Over' circuit. This will only be used when the Outstation is installed as an upgrade for older systems.

2.4.1 LMU I/O Board Features

Each I/O board has the following features:

(a) 10 High Voltage Photo-coupled Isolated Inputs (Controller mains supply and green and wait voltages).*

(b) 16 Low Voltage Photo-coupled Isolated Inputs (Detectors, Micro Switches and logic signals)

(c) 10 Analogue Inputs, surge protected (voltage and current Monitoring by way of voltage monitoring transformers and toroidal coils).

(d) 4 Isolated Relay Outputs with current limit (series 182 Ω resistors) on the first three outputs.

(e) Expansion Bus connection

(f) Modem Power supply Selection Circuit (choice of three supplies)

(g) Power dissipation less than 50 mW.

(h) 5V Failing Warning Circuit (monitors the battery supported DC input supply for a low level).
(i) Zero crossover Circuit (not normally used).
(j) Board address decoding (board expansion facilities).

*Option available for 48V AC (3RD Party ELV) signals. See below.

2.4.2 3RD Party ELV AC LMU I/O Board

A modified version of the LMU I/O Board has been created, known as the 3RD Party ELV AC LMU I/O Board. The 10 High Voltage Photo-coupled Isolated Inputs (feature list point ‘a’, section 2.4.1) have been adjusted to cater for signals running on 3RD Party ELV supplies.

This DOES NOT refer to Siemens Type negative rectified ELV (as in ST750 and ST900 ELV applications) but to nominal 48Vrms AC supply found in some 3RD Party controllers.
This board is NOT to be used within Siemens Type ELV controllers, hence the emphasis on ‘3RD Party’ and ‘AC’.

The 3RD Party ELV AC LMU I/O Board has been allocated the following part number, 667/1/26570/100, and is most easily identified by it’s ‘ELV ONLY’ warning labels (667/2/32365/000) affixed to the boards two protective cover guards. For clarification on the location of these cover guards, please refer to assembly drawing 667/GA/26570/ETC.

All other board features (points ‘b’ through ‘j’, section 2.4.1) match the original LMU I/O Board.

2.5 BUS / MOVA I/O BOARD

This is a 3U 220mm long, 100mm wide and 18mm high extended Eurocard. It is a multi-layer PCB, using mostly surface mount components. When used for Bus Processor or MOVA applications, the unit can be fitted with up to three Bus / MOVA I/O boards. If OMCU monitoring functions are also required, then a mix of LMU I/O boards and Bus / MOVA I/O boards can be fitted. I/O boards access the processor board by way of the Expansion Bus; see section 2.8 on page 31 for more details.

This board is available in two variants:

Variant /000 provides all facilities;

Variant /001 does not have the RS485 facility and is used as a parallel I/O card.

Four RS485 communications links are provided enabling communications with RS485 based equipment such as SIETAG and optionally the GPS receiver. (Variant /000 only)

The 48 digital inputs and 16 digital outputs meet the TR2210 (TR0141) specification and thus provide MOVA and DUSC with its stage force bit outputs to, and confirm inputs from, any traffic controller configured with a UTC/MOVA/DUSC interface. It also provides MOVA and DUSC with its detector inputs that can be connected in parallel to the controller.

Normally, modem power is provided by the CPU card. Alternatively, if required, this board can also provide this supply, with a choice of three different voltages offered. Unlike the LMU I/O board which uses one of its digital output relays to switch the modem power, the Bus / MOVA I/O board has this switching capability built in.

2.5.1 BUS / MOVA I/O Board Features

Each I/O board has the following features:

(a) 4 x RS485 Channels (Bus Beacon and Radio LAN Interfaces) (variant /000 only)
(b) 48 x TR2210 (TR0141) Digital Inputs (MOVA Detectors and Stage Confirm Inputs)
Note. When this board is configured as I/O board 1, the last four inputs are reserved and should not be used.
(c) 16 x TR2210 (TR0141) Digital Outputs (relays) with current limit (182Ω resistors)
(d) 2 of the 16 outputs can be switched down to 22Ω
(e) Expansion Bus connection
(f) Modem Power supply selection circuit (choice of three supplies)
(g) Power dissipation less than 2.5W when not supplying a modem (up to 3.6W when supplying the modem via the 5V supply and up to 5.3W supplying the modem via the 13.65V supply)
(h) 5V Failing Warning Circuit (monitors the battery supported DC input supply for a low level)
(i) Board address decode (board expansion facilities)

2.6 THE MODEM UNIT

There are four options available, a PSTN modem, a GSM modem, a PAKNET modem or a DSL modem.

2.6.1 The PSTN Modem Unit

This is an OEM unit for communication on the PSTN or private circuit.

a) Hayes 'AT' compatible
b) Auto dialling pulse and tone
c) Auto answering
d) CCITT from 300 bit/s up to 33,600 bit/s
e) Powered from the DC supply from the first I/O board
f) On line status indicators

2.6.2 The GSM Modem Unit

2.6.2.1 SQ864-GPRS Modem Unit

As of late 2011 Gemini units will be fitted with a Sequoia SQ864-GPRS modem where connection through the GSM network is required. As its name suggest the modem can also provide a GPRS connection.

The SQ-864 is quad band EGSM 850/900/1800/1900MHz which is compatible with all GSM mobile networks in the UK. Installation requires an antenna which may be either the standard cabinet mounted puck antenna (667/1/132600/005) or pole mounted antenna (667/1/132600/002).

The pole top aerial feeder is a fixed length of 15 metres. Where no signal pole is available within approximately 8 metres of the controller cabinet, suitable aerial mounting arrangements will need to be provided. Alternatively the case mounted antenna may be used.

To use the GSM OMCU with the SQ864 modem the RMS Instation must be equipped with a suitable PTSN modem. Operation of the SQ864 has been verified with the Hayes Accura V.92 model 08-15328 and Dynalink PK5-5600 modems. It is known not to operate with the Dynalink PK6. No others have been tried to date.

The user is responsible for setting up airtime agreements with their chosen network supplier, ensuring that there is adequate signal coverage at the site and obtaining the appropriate SIM card, which must be: -

- 3V type
- Phase 2
- Data only
- PIN disabled

There are three LEDs on the SQ864 indicating modem status as follows:-

LED colour	**State**
Red (STAT_LED)	Flash rate once per second: Net search / not registered / turning off Slow rate once every 3 s: Registered full service Constant ON: Ringing OR call in progress OFF: Module power down
Green (TGPIO_01)	Reserved / test only
Blue (TGPIO_02)	Reserved / test only

See drawing 667/CF/26598/020 in Appendix B for installation and set-up instructions.

GPRS Connection

The modem may also be used to provide a GPRS connection where Gemini is used for carpark and VMS applications. In order to work with GPRS some service specific information must be entered into the Gemini by way of handset commands (this is normally done by way of a script file).

First enter the GPRS attachment and context AT commands into the Gemini MOS command:-

mos=at+cgatt=1;+cgdcont=1,ip,APN

Where APN is the mobile service provider access point name eg. mobile.o2.co.uk for O2. Note the format of this command string is different from that which would previously have been entered for the MC35i. Next program the service username and password:-

gup=username:password

Finally the ppp authentication mode i.e. PAP/CHAP PAP=1 CHAP=2 eg:-

ppa=1

Completion of this input should allow the Gemini to connect to the mobile service provider over the GPRS service.

2.6.2.2 TC35 Modem Unit

This modem is a dual band GSM900/1800 unit but limitations of the aerial restrict its use in this application to the GSM900 network (Vodafone or Cellnet). In older units it will be a Siemens TC35 unit, more recent outstations will have been fitted with the TC35i.

To use the GSM OMCU, the Instation must be equipped with the PACE PCM33.6 or the Dynalink PK5-5600 Modem. See section 8.4.4 for compatibility details. Note that new or additional Instation modems may be required to support the GSM OMCU alongside other 5U and 3U units.

The user is responsible for setting up airtime agreements with their chosen network supplier, ensuring that there is adequate signal coverage at the site and obtaining the appropriate SIM card, which must be as follows:

SIM Card
3V type
Phase 2
Data only
PIN Disabled

If a GSM OMCU is used, an aerial must be fitted close to the Controller. The aerial feeder is a fixed length of 15 metres. Where no signal pole is available within approximately 8 metres of the controller cabinet, suitable aerial mounting arrangements will need to be provided. There is also a top level Outstation variant which provides for a case mounted antenna (667/1/32600/005).

There is one LED on the TC35 GSM unit. When the TC35 is powered the LED will flash; the LED comes on permanently once a GSM service is recognised.

See drawing 667/CF/26598/020 in Appendix B for installation and set-up instructions.

Note: The issue of the TC35 firmware must be 4.0 or above. To determine the issue of the firmware connect the 9-pin port on the TC35 to a PC serial port running a terminal emulator. Set the PC to 2400 bits per second, 8 bits no parity, 1 stop bit.

Press the return key several times and then enter ati<return>.

The TC35 should reply with:

Siemens
TC35
Revision 4.0
OK

Where a TC35i modem is fitted the firmware version should be 3.01 or above.

2.6.2.3 The MC35 GPRS Modem

The Siemens MC35 Terminal unit is a GSM modem capable of GPRS transmission. The MC35 supports GPRS transmission up to 21.4Kbps per time slot.
Interfaces to the unit include an RS232 data port, power and an FME (male) aerial connector. An integrated SIM card reader is included. A diagnostic LED shows the current state of the unit.

The MC35 Diagnostic LED is used to indicate the following states.

Operating state	LED
Immediately after power up	On for 2 seconds
Network search or No SIM card inserted or No PIN entered or No GPRS network available	Flashes approx 2 secs on, 2 secs off
Standby GPRS Network	Flashes twice quickly every 4 secs approx
Data Transfer	Flashes on for approx 1 sec when data is transferred. (This flash usually replaces the two quick flashes for the Standby state above)

2.6.3 The PAKNET Modem Unit

This is an OEM unit for PAKNET communications via radio.

a) Auto transmit and receive
b) 4,800 bit/s
c) Powered from the modem dc supply on the GEMINI^2 processor board
d) On line status indicators

Due to its size, it is not possible to mount this modem onto the back of the GEMINI^2 power supply unit. During installation of the Outstation a suitable place should be found within the associated cabinet.

2.6.4 The DSL Modem Unit

This is an OEM unit for DSL communications over a single pair of copper wires.

a) Data speeds from 272 Kb/s to 2320 Kb/s
b) Ethernet Interface – RJ45 Connection
c) Line Interface – RJ45 Connection
d) On line status indicators

Due to its size, it is not possible to mount this modem onto the back of the GEMINI^2 power supply unit. During installation of the Outstation a suitable place should be found within the associated cabinet.

2.6.5 3G Router Unit

A 3G router unit is available as an alternative means of utilising the cellular mobile network for remote monitoring and MOVA. Parts kit 667/1/32630/000 provides all parts necessary to convert a Gemini 2 unit to 3G comms. Installation and commissioning instructions are provided in the RMS to 3G Comms Quick Start Guide 667/CI/32630/000.

The 3G Router facility requires the use of an STC supplied licence code in order to be activated. The licence code is based on the Processor PCB being used. See section 6.3, step 23 **on page 115.**

2.7 THE POWER SUPPLY UNIT (PSU)

This is a 127mm long, 76.2mm wide and 37mm high OEM unit, which supplies the system with +13.65V. The Outstation uses a float charged battery held within the PSU case to provide total system backup in the event of mains' failure.

2.7.1 The Power Supply Unit (PSU) Features

(a) Wide range of AC input voltage
(b) 3000V isolation from the mains
(c) Can be powered by a 12V to 15V DC input supply. (Future enhancement)
(d) Fitted with a single 12V sealed lead acid battery (see section 7.6.3(a) on page 123)
(e) Automatic switching to the battery support in the event of mains failure to the system
(f) Automatic recharge on restoration of mains supply to the system
(g) 3 years minimum battery life (also see section 7.4 on page 120)
(h) Zero Cross Over – mains supply voltage timing circuit.
(i) 2 x High Voltage photo-coupled isolated inputs. Normally used for monitoring the states of the associated controller's mains and signal supply voltages.

Note: Graphos has a different PSU. See Graphos Product Handbook 667/HB/31200/000 (Section 4.18 – Graphos Gemini CPU) for the PSU features.

2.8 THE EXPANSION BUS

This is a set of 64 way plugs and sockets. Each board in the system has a connector fitted that passes through the PCB and becomes a socket on the component side and a plug on the solder side. The boards connect using these sockets and plugs through an additional connector, starting with the processor, by plugging an I/O board into its socket, then an I/O board into the I/O's socket and so on.

All boards provide buffering for Address, Data and Control signals and also distribute the logic supplies.

2.8.1 The Expansion Bus Features

(a) 24 Address lines
(b) 16 Data Lines
(c) 15 Control Lines
(d) +5V supply
(e) 13.65V Supply (Battery supported when optional battery fitted)
(f) Mechanical fixing at 25.4mm spacing
(g) "Plug able" (to allow expansion)

3. SPECIFICATIONS

3.1 INTRODUCTION

The following sections describe the full Electrical, Mechanical, Environmental, Isolated Outputs, Isolated Extra Low Voltage Inputs, Isolated Low Voltage Inputs, Analogue Inputs and Communications specifications of the unit.

3.2 ELECTRICAL

For Graphos see the Graphos Product Handbook 667/HB/31200/000 (Section 2.1 – Electrical Specification) for the Electrical information.

3.2.1 Mains Supply

Normally the unit is powered from an auxiliary mains supply provided within the controller. In controllers without this facility or if this is not convenient, a suitable alternative mains supply must be provided, being careful not to compromise the safety of the controller (Refer to Engineering if in doubt).

Voltage:	230V AC RMS, +15% to -20%
Frequency:	46 - 54 Hz
Mains fused:	The recommended rating of this external fuse is 2A anti-surge. (The mains cable is rated to 6A, fuses up to 5A may be used)

3.2.2 Power Supply

The unit incorporates its own internal power supply unit that provides the necessary supply voltages to all of the boards and assemblies associated with the complete unit. The boards are designed and implemented to operate from a single voltage regulated supply.

Output Supply:	Regulated 13.65V DC
Rating:	3.15A
Powering:	Processor board, I/O board(s), Modem and Charging the Battery

3.2.3 Power Dissipation

Low power CMOS devices are used throughout the unit to keep the power dissipation as low as possible.

Total power consumption	8.0 W typical (using maximum configuration of 3 x I/O boards and battery float charging)

3.2.4 Support Batteries

The Outstation unit is fitted with a rechargeable battery which supports the entire unit, including the modem, for a minimum of four minutes under all conditions in order that the Outstation may inform the Instation of a mains power failure. This battery must not be operated in the inverted position (i.e. with the terminals pointing downwards). See section 5.4.1 on page 77.

A Lithium coin cell battery is provided on the CPU and supports the RAM memory and the Real Time Clock during power failures for in excess of 7 months. This battery is plug-able to allow easy replacement.

The processor board also has a ‘Gold Cap’ capacitor fitted that allows the RAM battery to be changed without loss of RAM data. The Gold Cap device provides a minimum of 30 minutes support.

The two batteries have the following specifications:

Battery	Type	Support
Unit Battery	12V Lead Acid	20 minutes (Typical)
RAM Battery	Lithium 418/4/53433/000	In excess of 7 months after the main support battery has expired.

3.3 MECHANICAL

The construction of the unit is based on the standard 3U high, IEC297 Eurocard rack system. The unit does not use the conventional back plane approach. Instead it uses an expansion bus (see section 2.8 on page 31), to interconnect the boards electrically. It does not require the rack to have guide rails, but if present they need to be on 25.8mm spacing. Mechanically the boards are held in a stack, by four sets of pillars and fixings, and held in place on a mounting plate. The mounting plate also accommodates the Modem and PSU assemblies, and is used to fix the total unit assemblies to the 3U rack, or cabinet mounting side angle bracket.

See the Graphos Product Handbook 667/HB/31200/000 (Section 4 – System Elements) for Graphos mechanical information.

3.4 ENVIRONMENTAL

Temperature	-15°C to +60°C ambient
Humidity	20% to 95% non condensing at 40°C

3.5 ISOLATED OUTPUTS

GEMINI^2 Traffic Outstation boards are each equipped with a number of relay isolated outputs, two change-over contacts on the CPU board, four normally open contacts on an LMU I/O board and 16 change-over contacts on a BUS / MOVA I/O board. The following describes the electrical characteristics of these outputs:

	CPU Board Output	LMU I/O Board Output	MOVA I/O Board Output
On Output Impedance	182Ω ± 1%, 0.1 Watts	182Ω ± 1%, 0.5 Watts *	182Ω ± 1%, 0.1 Watts †
Off Output Impedance	100kΩ min.	100kΩ min.	100kΩ min.
Continuous Current Sink	50mA ‡	50mA ‡	50mA ‡
Breakdown Voltage	1500V	1500V	1500V
Isolated Voltage	1500V	1500V	1500V
Relay Type	Change-Over	Normally Open	Change-Over

Notes:

* Only the last three outputs on each LMU I/O board have the series resistor fitted. On old installations the first output is used to control the modem power (on the first board only) and so has no series resistor.

† The last two isolated relay outputs (circuits 15 & 16) have a switch that enables the resister value to be selected as either 182Ω or 22Ω (this allows for different applications).

‡ The continuous current sink is limited by the resistors.

3.6 DIGITAL INPUTS

The CPU board supports 8 x TR2210 (TR0141) compliant digital inputs. Each LMU I/O board supports 16 x fully software configurable photo-coupled extra low voltage isolated digital inputs and each BUS / MOVA I/O board supports 48 x TR2210 (TR0141) compliant digital inputs. These digital inputs have the following input electrical characteristics:

	CPU Board Inputs	LMU I/O Board 5V Working	LMU I/O Board 24V Working	MOVA I/O Board Inputs
Input Impedance	4300Ω*	4700Ω	>12000Ω	4300Ω*
‘Off’ Threshold	> 50kΩ	< 1V	< 12V	> 50kΩ
‘On’ Threshold	< 600Ω	> 3V	> 18V	< 600Ω
Recommended Max. Voltage	n/a	25.6V	39.4V	n/a
Absolute Max. Voltage	+1kV / -7V	49.4V	49.4V	+1kV / -7V
Isolation Voltage	2500V RMS		2500V RMS	n/a

* Referenced to 13.8V

Each of the LMU I/O board inputs employs an opto-Isolator, with additional circuitry to protect against reverse voltages and a degree of current limiting. The inputs are polarity sensitive and one polarity sense give 5V working whilst the other gives 24V working. (Also see 5.6.2.4 Digital Monitor Connections (LMU I/O Board Only))

3.7 ISOLATED MAINS VOLTAGE INPUTS

The processor board and the associated PSU PCB provide two photo-coupled mains voltage inputs. Each LMU I/O board also supports 10 x fully software configurable photo-coupled mains voltage inputs* and a fully configured OMCU provides 30 such inputs. The function of these inputs is to provide an isolated means of detection of the presence or absence, of the mains’ signal at the phase drive output terminal blocks. The following describes the electrical characteristics of a single input.

Each of the inputs again uses an opto-isolator, with additional circuitry, to protect against reverse voltages, to allow a wide range of mains inputs (including 50 – 0 – 50V AC working for Welsh Office application), also provides current and voltage limiting.

* Not applicable to the 3RD Party ELV AC LMU I/O Board. See section 3.8.

The High Voltage inputs have the following input electrical characteristic:

Input Impedance:	99kΩ
Absolute Max. Applied Voltage:	580V RMS
Min. Voltage to guarantee signal on condition:	40V RMS
Isolation Voltage :	2500V RMS

Note: Graphos has no ZXO signal, therefore mains monitoring is not performed.

3.8 3RD PARTY ELV AC INPUTS

The 3RD Party ELV AC LMU I/O Board supports 10 photo-coupled 48Vrms AC inputs rather than mains voltages. The function of these inputs is to provide an isolated means of detection of the presence or absence of the 3RD Party ELV AC signal at the phase drive output terminal blocks.

The 3RD Party ELV AC LMU I/O Board **DOES NOT** accept mains voltages of any kind. The 10 'High Voltage' inputs on this version of the I/O board will accept a maximum of 50Vrms AC and are clearly labelled as such. The following input electrical characteristics apply:

Input Impedance:	16.8kΩ
Absolute Max. Applied Voltage:	50V RMS
Min. Voltage to guarantee signal on condition:	15.5V RMS
Isolation Voltage :	2500V RMS

3.9 ANALOGUE INPUTS

Each LMU I/O board supports 10 fully software configurable analogue inputs. The function of these, when connected to appropriate current sensing toroidal transformers, is to measure the current supply to the lamps, or when connected to the appropriate voltage monitor transformer, measures the true level of the lamp supply voltage (dim or bright). The following describes the electrical characteristics of a single input.

Each of the inputs is multiplexed to an analogue to digital converter. The analogue inputs are designed to work with both the current sensing transformer that will measure currents from 0A to 6A peak (and will accept short term current flows of 12A) and the Voltage monitor transformers, which will measure voltages from 0 to 276V.

Current sensing: 6A peak
Voltage monitor: 9V peak to peak @ nominal mains

3.10 COMMUNICATIONS

The processor board contains three serial RS232 and one Ethernet communication port. The variant /000 of the Bus / MOVA I/O board contains four RS485 communications interfaces which are described on the following page. These interfaces are fully software programmable in terms of their transmission characteristic.

The three RS232 and the single Ethernet communications interfaces are shown on 667/GA/32600/000 in Appendix B and are as follows:

3.10.1 Communications Channel 1 TR2210 (TR0141) Port

Location: On back edge of Processor Board
(see 667/GA/32600/000 in Appendix B)

Connector Type: 25 Way 'D' Type on the end of a flying ribbon cable connected to Plug PL4.

3.10.2 Communications Channel 2 (Modem Port)

Location: Towards the back edge of Processor Board
(see 667/GA/32600/000 in Appendix B)

Connector Type: 25 Way 'D' Type on the end of a flying ribbon cable connected to Plug PL2

3.10.3 Communications Channel 3 (Handset)

Location: On front edge of Processor Board
(see 667/GA/32600/000 in Appendix B)

Connector Type: 25 Way 'D' Type mounted on board. See Section 3.10.6 for details.

3.10.4 Communications Channel 4 (Ethernet)

Location : On the back edge of CPU Board
(see 667/GA/32600/000 in Appendix B)

Connector Type: RJ45 Socket.

3.10.5 RS485 Communications Interfaces

In addition to the four RS232 communication interfaces, the Bus / MOVA I/O Board (variant /000) includes four serial RS485 communication interfaces located on the 14 way IDC board connector mounted on the front of the board.

Interface :	RS485
Isolation :	1000V
Link Type:	Master on Multi-drop line
Master Bias:	560Ω Bias Resistors
Line Termination:	Two 120Ω Terminating Resistors (selected by switches)

3.10.6 RS232 Handset Interface

Type

RS232C CCITT V24 and V28

Method of Connection

Traffic Outstation – Cannon DP 25-way socket connector
Terminal Device – Cannon DP 25-way plug connector

Pin Allocation

Pin 1 – Protective ground
Pin 2 – Transmit data from terminal to controller
Pin 3 – Received data from controller to terminal
Pin 4 – Request to send
Pin 5 – Clear to send
Pin 6 – Data set ready
Pin 7 – Signal ground
Pin 9 – 5V supply (see below)
Pin 10 – 5V supply (see below)
Pin 18 – 5V supply return
Pin 19 – 5V supply return
Pin 20 – Data terminal ready

Pins 9 and 10 are connected to the Outstation's 5V logic supply and can supply a maximum of 250mA in total.

Bit Format

START BIT	1	2	3	4	5	6	7	PARITY	STOP BIT
(SINGLE BIT)	(LSB	•	•	•	•	•	MSB)	(EVEN)	(SINGLE BIT)

Baud Rate

1200, 9600, 19200 and 57,600 Baud – Auto-detect

Mode

Full duplex

Character set

ISO alphabet No. 5 (ASCII)

4. FACILITIES

4.1 INTRODUCTION

The Siemens GEMINI^2 Traffic Outstation provides a flexible multi-function hardware and software platform, with sufficient interfaces to allow sophisticated monitoring and control tasks to be developed and executed.

Section 4.2 highlights the facilities available on the GEMINI^2 Traffic Outstation when used as a Siemens RMS OMCU, Bus Processor or Car Park Count OMCU.

Section 4.2.9 describes the DUSC facility.

Section 4.2.10 describes the Flow facility.

Section 4.2.11 describes the Occupancy facility.

Section 4.2.12 describes the OMCU Events and Switch Overrides facility.

Section 4.2.13 describes the Vehicle Classification facility.

Section 4.2.14 describes the Graphos facility.

Section 4.3.1 describes the UTMC OTU facility.

Section 4.3.2 describes the UTMC VMS facility.

Section 4.4 describes the facilities available with the GSM OMCU option.

In addition, the GEMINI^2 Traffic Outstation may be used as the hardware platform for the MOVA software developed in association with the Transport Research Laboratory. See section 9 which starts on page 140.

4.2 OMCU AND BUS PROCESSOR FACILITIES

The following provides an outline of the facilities supported by the Siemens OMCU. During the configuration process, timing limit, Bus data, DUSC data, Vehicle Classification data, flow data, occupancy data, OMCU Event data, Switch Override data, status check data and Graphos data is downloaded to the OMCU, via modem or Ethernet link, to provide the following facilities:

- Signal Lamp monitoring
- Detectors and Push Button monitoring
- Controller Status Checks
- Controller Timing Checks
- DUSC Facility
- Flow Facility
- Occupancy Facility
- OMCU Events and Switch Overrides Facility

- Vehicle Classification Facility
- Local bus priority facilities in association with the Siemens SIETAG reader system or certain TfL London Bus Priority beacons or an RTIG radio link.
- Vehicle selective access control, also in association with the Siemens SIETAG reader system or certain TfL London Bus Priority beacons or an RTIG radio link.
- Graphos Facility

Any fault detected is logged and reported to the Instation identifying the type (i.e. signal lamp or detector, etc.) and location (i.e. Phase A-RED or stage 2 demand, etc.).

Some reported faults are automatically ‘cleared’ by the OMCU itself; others can only be ‘cleared’ by manual means at the Instation. The following lists indicate which reports clear automatically.

In addition to the OMCU Fault Log, an Operations Log is also maintained which records all activity related to Vehicle Classification, Bus / Access control actions, Flow statistics and Occupancy statistics. This may be interrogated locally at the OMCU or uploaded to the Instation for further analysis.

Note: Not all of the following will be applicable to every controller.

4.2.1 Signal Lamp Monitoring

Under this category the following is provided:

(a) Signal lamp bulb failure (phase and colour) – automatically cleared.
(b) Wait lamp bulb failure – automatically cleared.
(c) Regulatory Sign tube failure – automatically cleared.
(d) Dim/Bright change failure – automatically cleared.
(e) Pedestrian Flash Failure – automatically cleared.
(f) Switch Sign bulb failure – automatically cleared.
(g) Signal Lamps on or off – automatically cleared.
(h) Signal lamps flashing or not flashing – automatically cleared. (Applicable to export sequences only.)

4.2.2 Detector and Push-Button Monitoring

Under this category the following is provided:

(a) Detector Fault – both stuck active and inactive
(b) Push Button fault – both stuck active and inactive
(c) Dual or Single Fault Timer monitoring – on any selected digital input
(d) Detector Transition Counting
(e) Detector Counting – N and N + 1 algorithms

4.2.3 Controller Status Checks

Under this category the following is provided:

(a) Controller mode, i.e. Manual, Fixed-Time, V.A
(b) Controller Stuck – applicable to Fixed-Time mode only
(c) Controller ignoring demands – including call/cancel and filter demands
(d) Controller mains supply re-applied.
(e) Conflicting Phase Greens
(f) Stage sequencing fault
(g) External signal active, e.g. cabinet door open
(h) TR2210 (TR0141) controller fault log
(i) Controller/OMCU Handset Terminal connected

4.2.4 Controller Timing Checks

(These checks are **not** normally required on a TR2210 [TR0141] controller)

Under this category the following is provided:

(a) Short Stage Minimum
(b) Short and Long Stage Extensions
(c) Long Stage Maximum
(d) Long Alternative Stage Maximum
(e) Short Phase Inter-green
(f) Long Inter-Stage
(g) Long All-Red
(h) Variable Maximum Timing Log
(i) SDE/SA Extension Request Log

4.2.5 Bus Processor Functions

When used for Bus Processor applications, the unit can be connected to up to 12 SIETAG readers, City of London (TfL) bus priority beacons or a single RTIG radio sub-system (see section 5.6.4 for wiring) to provide logging, priority and access control functions.

Vehicles to be given access / priority via SIETAG are fitted with an electronic tag that may be programmed with, amongst other things, vehicle operator identification and individual vehicle number. A loop is located in each access lane, which is used by a reader to interrogate tags as they pass over.

Vehicles to be given access / priority via beacons and RTIG are generally fitted with intelligent in-vehicle systems capable of providing a level of real-time information based on current position and adherence to a known timetable.

Data from the vehicles is filtered by the Bus Processor which will log the information. The Bus Processor can be programmed to output access requests to barriers or other equipment such as Traffic Controllers, via up to 16 isolated relay contacts (expandable to 48 with additional I/O boards).

Several levels of filtering may be configured in each Bus Processor. Filtering options range from specific access for uniquely identified vehicles to all vehicles of a particular operator. Access may be restricted by time of day and individual or groups of vehicles may be blacklisted.

4.2.5.1 Routing SIETAG Vehicle Detections to an OTU

An overview of the SIETAG OMCU – OTU facility is shown in the following figure.

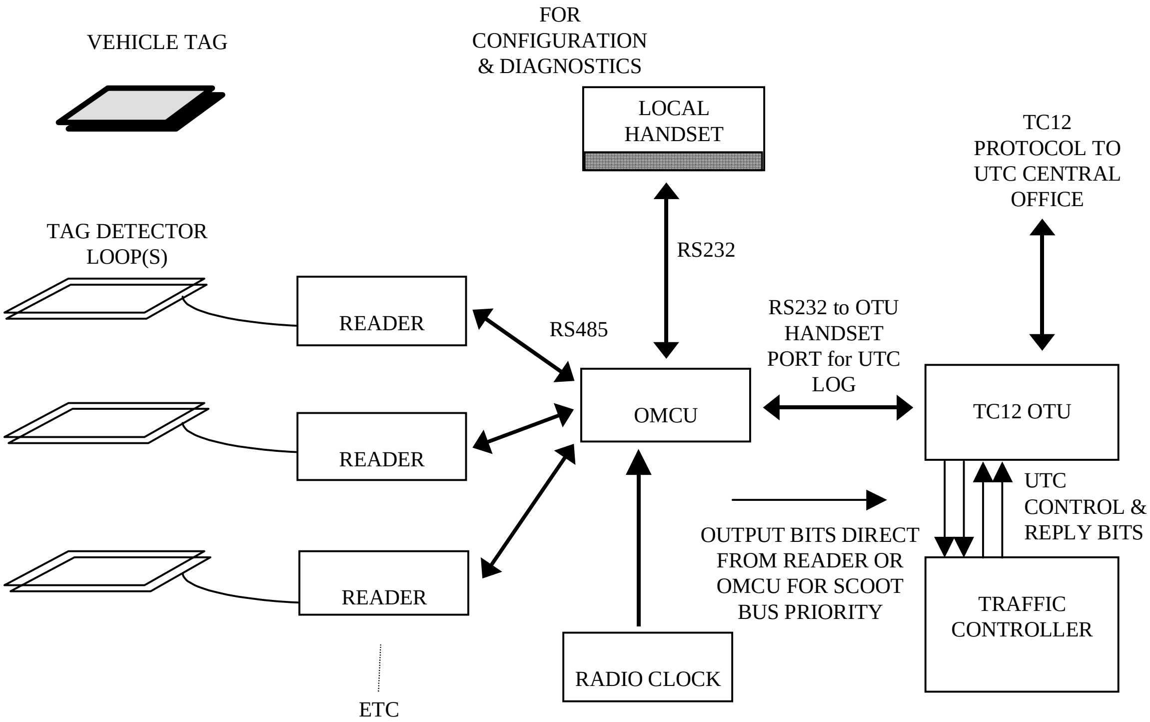


Figure 9 – SIETAG OMCU to OTU

The Bus processor may be locally configured via the handset (LDV=4) to route SIETAG vehicle detections through the 141 serial port to an OTU as a sequence of 13 GED environmental sensor commands. Each set of 13 commands comprises of the original 8 bytes of the vehicle detection, prefixed by a time stamp and the identification of the SIETAG reader that supplied the detection. The SIETAG reader identification must be configured by the user via the handset (using the BID handset command – see section 13.10), otherwise a default of 0 is returned for each vehicle detection, irrespective of the SIETAG reader that supplied the vehicle detection.

> **NOTE:** The Loop number supplied with vehicle detections from V3.3 or later SIETAG readers is not supplied to the OTU.

The data byte accompanying each command is decoded by the OTU and relayed as 16 reply bits to a UTC Instation where the information can be used for applications such as travel times analysis.

This facility uses the standard 141 serial cable 667/1/26579/000 to connect the unit to the OTU handset port.

Once the OMCU – OTU cable is connected and LDV=4 entered, the XXC command can be used to gain access to the OTU handset (XXO is used to revert to the OMCU handset).

The OTU must be appropriately configured to provide the throughput to the UTC using the following handset commands. Normal OTU configuration parameters, such as:

Mnemonic	Description
GAD	OTU Address
GMM	Line Characteristics of OTU / UTC Link
GNO	Total Number of OTUs on the same OTU / UTC Link
GRW	Number of Reply Bytes (2 required for this application)
GOE	Enable UTC Reply / Control Byte Interface

Plus the following to configure and enable the environmental sensor interface:

Mnemonic	Description
GRL r b = 57	Assign Environmental Sensor Data to Reply Bytes (16 bits), starting at reply byte ‘r’ bit ‘b’
GEC n = 1	Enable Environmental Sensor Channel ‘n’ (repeat for n = 1 to 13)

Details on the use of the OTU handset commands can be obtained from the TC12 Installation, Commissioning and Maintenance Handbook 667/HE/43100/000.

NOTE: When this facility is configured, the unit cannot perform controller monitoring via the 141 serial port.

The following version of firmware is required for the standard Bus Processor functionality plus the routing of the vehicle detections to an OTU.

4.2.6 ST800/700 Enhanced Link

The ST800/700 enhanced serial link provides a new high data rate link over the standard 141 cable between the Siemens ST800/700 traffic controller and the Siemens GEMINI^2 Traffic Outstation. This link allows the two units to continuously communicate with each other in order to provide a more integrated overall traffic product.

Normally, an Outstation requires lots of wires to be connected to various points in the traffic controller to allow the OMCU to monitor and control the controller. This new enhanced link has removed the need for much of the wiring and less wiring not only simplifies the installation, but also should provide a more reliable product – fewer wires mean fewer connections that can fail.

As a more integrated product, the traffic controller provides some of the facilities that previously only the OMCU could provide. The controller performs the lamp monitoring and detector fault monitoring, passing any fault information to the OMCU for reporting to the RMS Instation. The controller's digital inputs and mains states, etc. are also passed over the serial link allowing the OMCU and MOVA applications to read them as though they were connected directly to the unit.

For more information on MOVA using the enhanced 141 link, see section 9.6.4 on page 153.

The OMCU enhanced 141 link is configured on RMS screen 010, by selecting the Monitoring Type as "Serial" rather than "Full" when the controller type is "800P". The ST800/700 traffic controller itself does not need to be configured to enable the enhanced serial link to the OMCU application.

However, the ST800/700 traffic controller needs to be configured to use 'Serial MOVA' rather than its normal digital I/O UTC interface. Also, the "MIO" handset command may be required to configure MOVA to use the enhanced 141 link rather than its I/O board. Again, see section 9.6.4 on page 153 for more information on MOVA and the enhanced 141 serial link.

The OMCU handset command EEL can be used to examine the state of the enhanced link (see section 13.8 on page 245).

When the enhanced ST800/700 link is enabled, the OMCU handset commands operate as described below (any commands not listed operate as before):

Command	Operation (when enhanced link enabled)
LMR, KAC, KLS, KAS	These commands are inactive – use the corresponding lamp monitor commands directly on the controller.
KDB	Displays dim/bright state based on the controller lamp supply voltage received via the serial link.
KLM	Displays the lamps' on/off state as received from the controller via the serial link. The OMCU reverts to using the state of its second mains' state input, if the controller link fails. If the mains state input is not connected and the link fails, then 'lamps off' is reported.
PGS	Displays the phase green states received from the controller via the serial link
CPP	Current Phase Pattern, derived from phase green states (the phase patterns are defined on the configuration data screens for the OMCU).

Command	Operation (when enhanced link enabled)
CST	Displays the current stage for stream 0, received from the controller via the serial link
MDE	Displays the controller mode for stream 0, received from the controller via the serial link
MSI	Displays the OMCU mains state inputs (not controller greens)
DIP	Displays the OMCU digital inputs (not controller inputs)
SOB & SOP	Displays/sets the OMCU digital outputs (not controller outputs)

4.2.7 Car Park Count Detection

A mechanism is provided to enable car park occupancy to be determined.

A total of 10 detector loops can be connected to the OMCU. These are configured as either car park entry or exit loops. The occupancy of the car park is determined by the difference in the number of vehicles entering and exiting the car park.

Car park counts can also directly from an APT Skidata system instead of from individual loops.

See section 10 for more details.

The following data is transmitted to the Instation:
Car park Occupancy
Failed Detector Loops (both stuck active and inactive)
Power Fail
Cabinet Door open
Car park state (Full, Almost Full, Empty or Closed)
Loop Counts

4.2.8 PAKNET / GPRS interface

When the OMCU is used to detect car park occupancy, the information is passed to the SIESpace Instation via either a PAKNET interface or by GPRS, rather than the PSTN.

PAKNET is Vodafone’s packet data network. This is connected to the Instation via a ‘Radio-Pad’, which is an asynchronous terminal device that replaces the modem on the OMCU.

GPRS provides radio communications utilising GSM public mobile telephone networks provided by the likes of O2, Vodafone and Orange. GPRS provides a TCP/IP based link where data is charged by the amount transferred and not the duration of the connection.

4.2.9 DUSC Facility

The DUSC facility is very similar to CLF used in the ST800/700 traffic controller, whereby plans are introduced at specific times of day and each plan cycles through a configured sequence of groups in a repeating cycle. At each configured group time within the cycle, the OMCU activates the specified outputs to influence the controller movements (See DUSC user handbook for full details).

Plans are introduced by the timeswitch table i.e. dependent on the time of day, day of the week and (optionally) on the date. Plans can also be introduced via the handset or via user defined conditioning. The DUSC facility has the following features:

(a) Up to 16 plans, with 32 groups per plan. Up to 32 streams.

(b) Timeswitch table with up to 64 entries.

(c) Plan compliance checking and fault reporting.

(d) Fault report of simultaneous green confirms (G1, G2 active).

(e) Real time update information includes current plan, current group, forces, confirms, on/off control and cycle time.

(f) “Remote Reconnect” (RR) input available on OMCU to disable plan control for maintenance purposes.

(g) There are 3 methods of interfacing with an ST800/700…

- Control Force and Reply (See section 4.2.9.1 – Force Bit Control Installation)
- 141 cable (See section 4.2.9.2 – ST800/700 Enhanced Serial Link Control Installation)
- Detector Control (See section 4.2.9.3 – Detector Control Installation)

4.2.9.1 Force Bit Control Installation

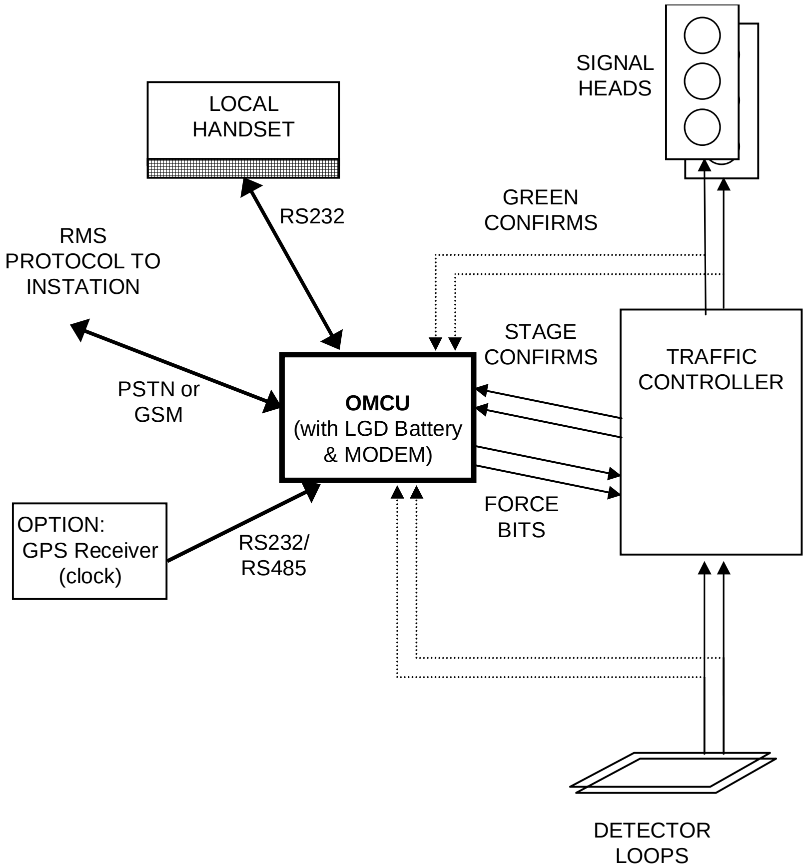


Figure 10 – Force Bit Control Set-up

Figure 10 shows how an OMCU can be set up for Force Bit control. This type of set-up is used when the controller provides a UK standard UTC style interface. It shows the ‘Force Bits’ from the OMCU being fed into the traffic controller, via the TR0141 UTC Interface. It also shows the ‘Stage Confirms’ coming back from the traffic controller to the OMCU. Although the ‘Demand Bits’ and ‘Green Confirms’ are still being sent to the OMCU for lamp monitoring and DFM, etc, the CLF ignores this information, as it is getting its information from the stage confirms.

4.2.9.2 ST800/700 Enhanced Serial Link Control Installation

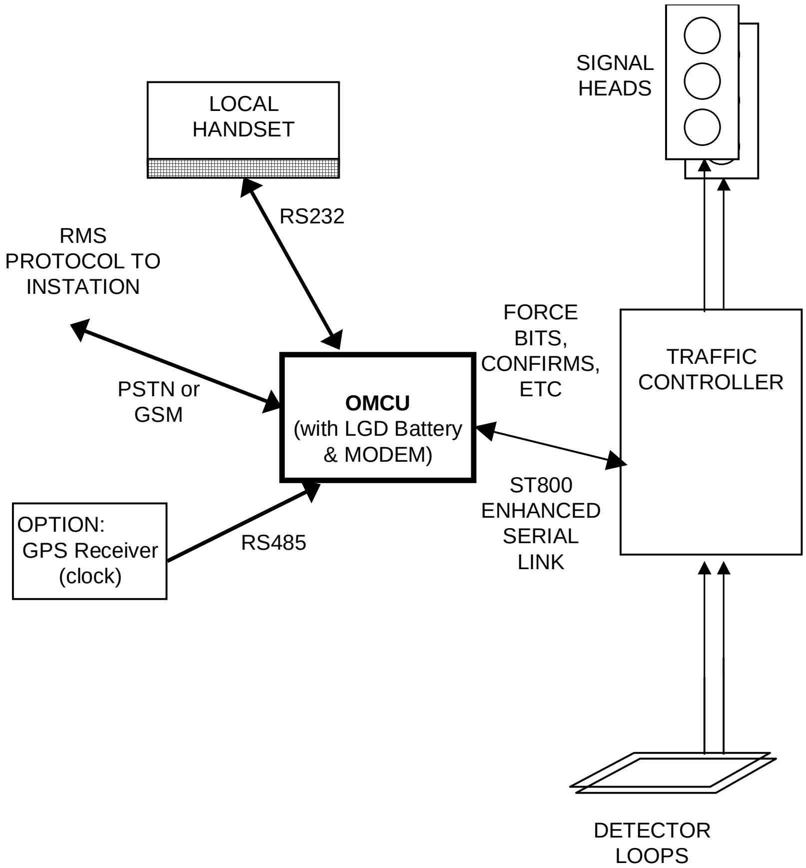


Figure 11 – ST800/700 Enhanced Serial Link Control Set-up

Figure 11 shows how an OMCU can be set up for the ST800/700 Enhanced Serial Link control. It shows all the information being fed between the OMCU and the traffic controller, via the ST800/700 Enhanced Serial Link.

4.2.9.3 Detector Control Installation

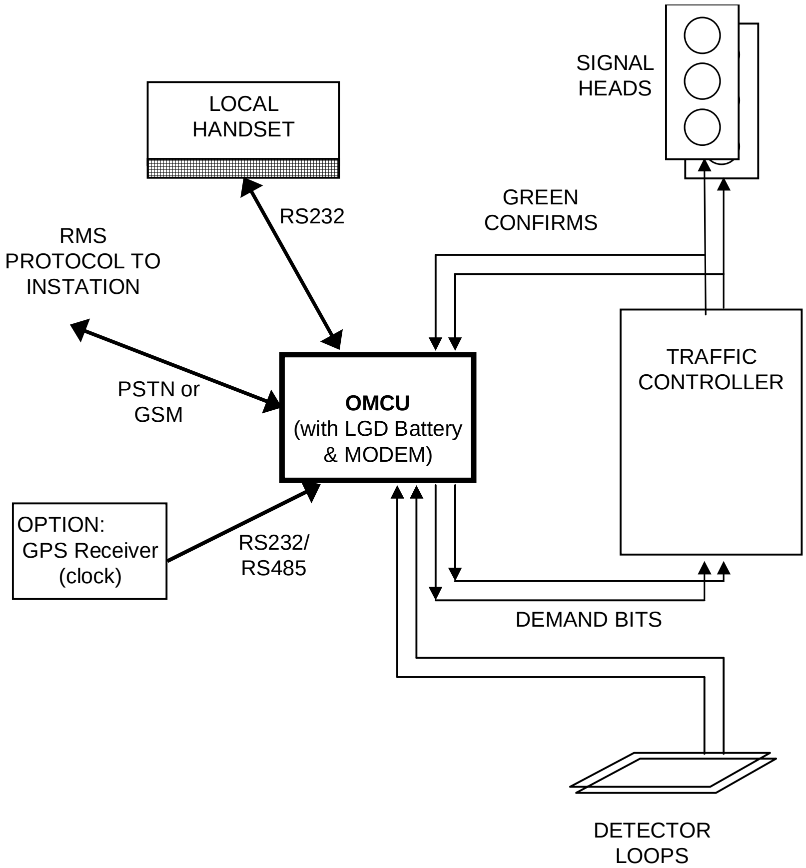


Figure 12 – Detector Control Set-up

Figure 12 shows how an OMCU can be set up for Detector control. This set-up is only used where controllers are not to UK standard with a UTC interface, i.e. it can be used with any vehicle actuated controller. It shows the ‘Demand Bits’ from the Detector Loops being fed into the OMCU, which are then sent out from the OMCU to the traffic controller. It also shows the ‘Green Confirms’ coming back from the traffic controller to the OMCU.

4.2.10 Flow Facility

The Flow facility has 16 detectors; each provides flow data over a configured period of time. Configuration data for this facility includes: Flow Up Threshold, Flow Down Threshold, Flow Smoothing Factor and Flow Count Period.

The Instation will send a Log Flow Request to the OMCU. It will request the OMCU to start/stop accumulating smoothed flow data after a specified delay. The delay is computed by the Instation so that the command will be executed by the OMCU at the time of day specified by the user.

The OMCU will reply to the Log Flow Request with a message indicating that the Log Flow Request has been received.

For each interval completed a report is generated and stored in the Operations Log. When the final interval has been completed and report generation has been enabled, a report is written to the Fault Log to indicate that Flow Logging has been completed and is ready for uploading.

More accurate values of flow data can be obtained at 2 or 3 sites, using the N+1 Count Data. The flow threshold would be for the complete carriageway rather than individual lanes.

In addition to the collation of the flow data, the flow data can be monitored and compared to the configured up/down thresholds. If the flow data meets the ‘up’ or ‘down’ threshold, the related OMCU Event can be activated/deactivated and the flow alarm is raised/cleared.

4.2.11 Occupancy Facility

The Occupancy facility has 16 detectors; each provides occupancy data over a configured period of time. Configuration data for this facility includes: Occupancy Up Threshold, Occupancy Down Threshold, Occupancy Smoothing Factor and Occupancy Count Period.

The Instation will send a Log Occupancy Request to the OMCU. It will request the OMCU to start/stop accumulating smoothed occupancy data after a specified delay. The delay is computed by the Instation so that the command will be executed by the OMCU at the time of day specified by the user.

The OMCU will reply to the Log Occupancy Request with a message indicating that the Log Occupancy Request has been received.

For each interval completed a report is generated and stored in the Operations Log. When the final interval has been completed and report generation has been enabled, a report is written to the Fault Log to indicate that Occupancy Logging has been completed and is ready for uploading.

In addition to the collation of the occupancy data, the occupancy data can be monitored and compared to the configured up/down thresholds. If the occupancy data meets the ‘up’ or ‘down’ threshold, the related OMCU Event can be activated/deactivated and the occupancy alarm is raised/cleared.

4.2.12 OMCU Events and Switch Override Facility

The maximum number of OMCU Events and Switch Overrides is 16. Each OMCU Event and Switch Override is independent and more than 1 can be active simultaneously.

Configuration data for the OMCU Events facility includes Debounce Active Delay and Debounce Inactive Delay.

An OMCU Event has to be continuously active for the configured active debounce time, before a report is written to the Fault Log, indicating the OMCU Event is active. Conversely, an OMCU Event has to be continuously inactive for the configured inactive debounce time, before a similar report is written to the Fault Log, indicating the OMCU Event is inactive. The Instation then processes these events via a decision tree and takes the appropriate configured response (Switch Override).

The RMS Instation can request a Switch Override at the OMCU, when the OMCU Event becomes active. The OMCU will reply to the Switch Override Request with a message indicating that the Switch Override Request has been received.

When the OMCU starts the Switch Override (start time is reached) and report generation is enabled, a report will be written to the Fault Log to identify the start of the Switch Override.

The Switch Override will remain active for a fixed period of time, or until cancelled from the Instation.

A similar report will be generated at the end of the Switch Override, (end time is reached, assuming that an indefinite override period has not been specified) if enabled.

4.2.13 SieClass Vehicle Classifier Facility

The Vehicle Classification facility provides classification of vehicles by length into a maximum of 14 user specified length categories. Vehicles that exceed the length in the longest length category are assigned to the “Unassigned” length category. Vehicles that are not able to be measured (e.g. transit one of the loops only) have zero length and are assigned to the “Unmeasured” category. Each length category is configurable to provide user names for the categories, e.g. “Car / Small Van”.

Vehicles may be logged on up to 8 loop pairs distributed across up to 4 sites, each site containing up to 8 lanes. It is recommended that the facility use standard SDE/SA loops of typically, 2m loop length and 3.5m loop separation. The ST4R loop detector is also recommended.

It is important to note that differently sized loop pair configurations must be assigned to different sites.

The vehicles may be individually logged in the Operations Log when they are detected as VC events. The VC event identifies the vehicle type, length, speed, headway and action taken (if any) on detecting the vehicle. Each value may be optionally configured for inclusion / exclusion from the VC event. VC event logging may be enabled / disabled for any given lane within a given site via the configuration download.

The user is able to freely specify up to 32 detection conditions via special conditioning e.g. vehicles of between 2m and 5.5m in length occurring at a given site travelling in excess of 80kph. Of these 32 detection conditions, up to 16 may be selected for statistical collection purposes.

NOTE: Non-vehicle classifier special conditioning mnemonics may be used in the definition of the detection conditions, however they should not be mixed with the vehicle classifier special conditioning mnemonics.

Vehicle detections may be collected over a user specified averaging period of between 1 and 60 minutes to be summarised in the Operation Log as TD events by average speed, average occupancy and average headway. The average speed, headway and occupancy values may be recorded on a site or a lane basis or be omitted entirely. The statistic categories increment during the averaging period to reflect the occurrence of user defined detection conditions. These category counts are presented in the Operations Log alongside the summary information in the TD event described above. The statistic categories may be omitted from the TD event.

The data collection is synchronised to the minute boundary. The time stamp associated with the TD event corresponds to the end of the averaging period.

TD event generation may be enabled / disabled via the configuration download.

When vehicle detection satisfies a detection condition, a DC event may be recorded in the Operations Log identifying the detection condition. It is possible for a single vehicle detection to satisfy more than one detection condition (depending on how the detection conditions have been defined) and hence there may be more than one DC event associated with single vehicle detection.

The DC, VC and TD events in the Operations Log may be selectively uploaded to the RMS Instation for analysis.

The occurrence of a user-defined condition may be used to force the activation of one or more OMU outputs (up to a maximum of 16 allocated across 2 output ports) to trigger an action in an external device such as a traffic controller. A configurable text message may also be presented to one or more message signs such as UVMS or a SIESPACE sign. A sign may be connected to the 141 serial port or one of the available RS485 serial ports on a 1 to 1 basis. The text message is displayed for a configurable period and may be subsequently blanked by a blanking message applicable to the sign or be replaced by a second text message. NOTE: If a second text message is output to the sign, the message will remain on the sign until another action causes the same sign to be addressed. Alternatively, the sign configuration could perform a self-blanking using a suitable inactivity timeout.

Confirmation checks are carried out to detect the absence / presence of an expected input state arising from an output activation. The absence of an expected input state for a configured period generates a fault in the Fault Log. The presence of the expected input state for a configured period clears the fault (if the fault is present).
The RMS Instation operator may manually reset the fault.

NOTE: Confirmation checks are not performed on sending text messages to a sign.

Vehicle absence / presence faults are generated in the Fault Log if a vehicle is not detected over a loop / detected over a loop for longer than the configured absence / presence time. Both fault types are automatically cleared by the OMU. The RMS Instation operator may manually reset both fault types.

The Vehicle Classification facility also supports a loop pair fault algorithm. This algorithm identifies a loop pair as faulty if one of the loops is activated on N consecutive occasions with no activations on the other loop. The fault is cleared by the OMU if there are M activations (not necessarily consecutive) of both loops. N and M are configurable values.

The RMS Instation operator may manually reset the loop pair fault.

There is a set of read only handset commands to allow the user to examine the Vehicle Classifier configuration data items – see section 13.18.

The Vehicle Classification facility requires the use of an STC supplied licence code in order to be activated. The licence code is based on the OMU telephone number and is downloaded as part of the Vehicle Classification configuration data from an RMS Instation. See section 6.3, step 23 on page 115.

4.2.14 Graphos Facility

The Graphos facility provides communication to a range of variable message signs. The signs are characterised into three types:

- **Speed warning signs.** These signs are activated by speed measuring detectors. The detectors can be loop or microwave based. The signs are blank for a great proportion of the time but illuminate when vehicles are detected travelling in excess of the speed limit and display the speed limit to remind drivers of the speed limit in force.

- **General purpose warning signs.** These are used to warn motorists of potential hazards such as sharp bends ahead. They are similar in function to Speed Warning signs but are usually larger and use symbols mostly within the red warning triangle. They usually are activated by vehicles travelling over a speed threshold but other activation methods are possible. Alternative activation methods are axel measurement via loops for weight restrictions or high detection for low bridges, etc.

- **Variable speed limit signs.** These signs are used to set the speed limits and allow them to be changed, usually at certain times of the day. Typical applications are for use around school entrances, to reduce the speed limit, for example to 20 mph, at times of the day when school entrances are active. These signs usually do not have any form of detection present as the variable speed limit is activated by a time table held within or communicated to the sign.

The Graphos facility can generate and report the following failures to RMS:

(a) Communication Fault/Power Fail – automatically cleared.
(b) Invalid set message – manually cleared.
(c) Receiving data from unconfigured signs – manually cleared.
(d) Radar has not triggered – manually cleared.
(e) Voltage on LDB board is missing – manually cleared.
(f) LED driver board system fault – manually cleared.
(g) Invalid picture number in last Set – manually cleared.
(h) Ambient Light Sensor failure – manually cleared.
(i) LED Failure Detected – automatically cleared.
(j) Incorrect Picture being Displayed – manually cleared.
(k) LDB board is missing or defect– manually cleared.

Figure 13 gives the Graphos Block diagram.

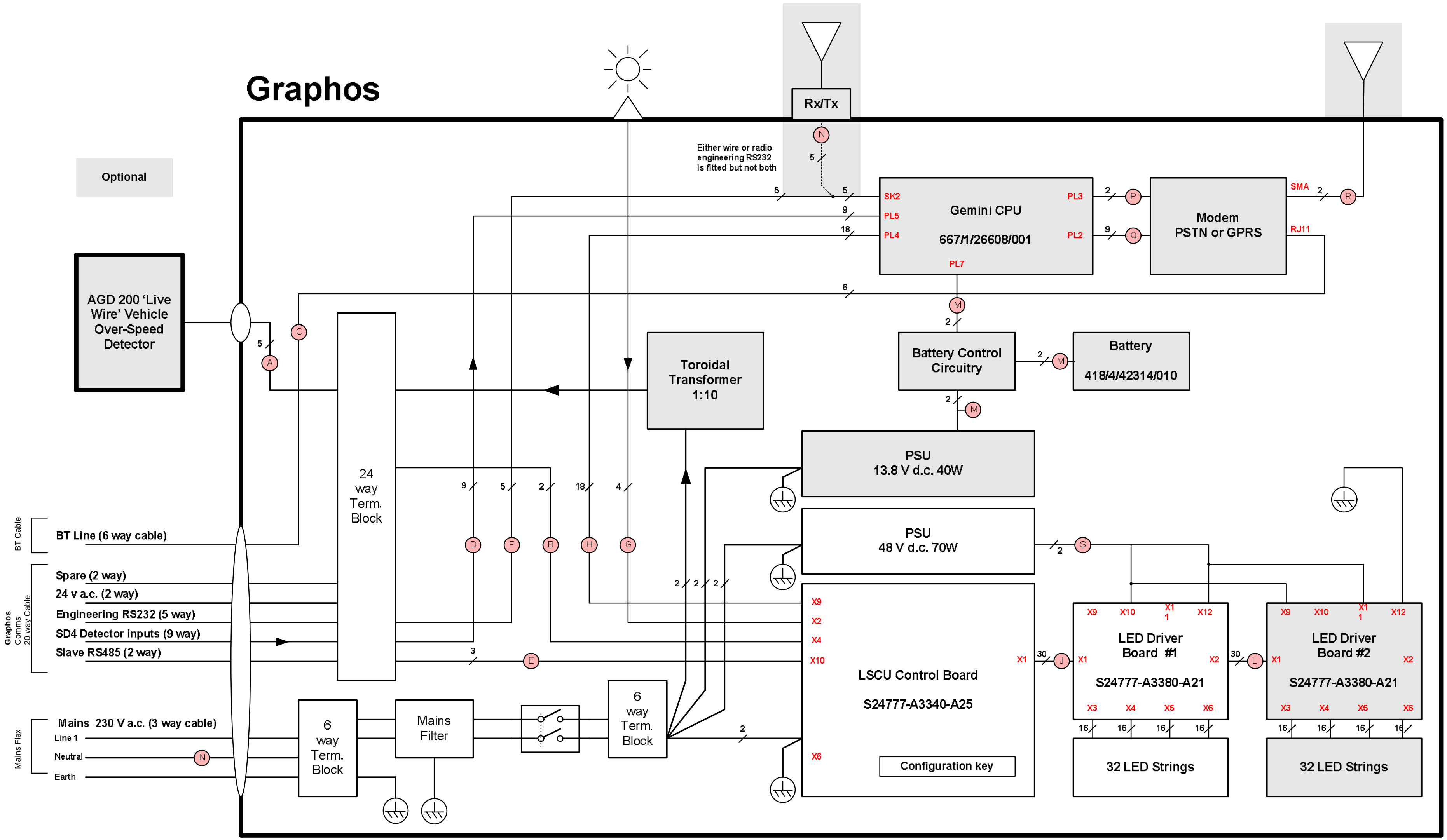


Figure 13 – Graphos block diagram

4.2.15 RMS Firmware Download Facility

The Siemens GEMINI2 Traffic Outstation supports the remote download of firmware from an RMS Instation over a PSTN link. The Outstation configures its modem for 19200,8,N,1 operation.

This facility is not supported when an RMS Instation is connected to the local handset.

The download of firmware is initiated by the RMS operator. When the download has completed the Outstation switches to using the downloaded firmware when instructed to do so by the RMS Instation. If required by the RMS operator, the Operations Log may be uploaded to the RMS Instation, before the switch takes place.

The Outstation performs a reboot and initialisation in order to switch to the downloaded firmware. During the switch over, the new firmware will attempt to execute with the configuration data that the previous version of firmware used. If the new firmware requires configuration data items not contained within the recovered configuration data, the unit must be reloaded with a new configuration.

The RMS operator is informed of firmware download completion, switch firmware request and switch firmware completion only when the unit has been configured.

If the version number of the download firmware is lower than that of the executing firmware OR the part numbers differ and the version numbers match, then it will not be possible to revert back to the executing firmware once the switch has occurred.

For example
Downloaded firmware 12686 Issue 2, executing firmware 12686 Issue 3
Downloaded firmware 12686 Issue 2, executing firmware 12687 Issue 2
In both the above scenarios, the Outstation will contain only firmware 12686 Issue 2 after the switch.

If the version number of the download firmware is higher than that of the executing firmware, then it will be possible to revert back to the executing firmware once the switch has occurred.

For example
Downloaded firmware 12686 Issue 3, executing firmware 12686 Issue 2
In this scenario the Outstation will contain both firmwares after the switch.

The Outstation continues to operate normally during the download of firmware.

4.3 UTMC FACILITIES

4.3.1 UTMC OTU Facility

The Siemens GEMINI^2 Traffic Outstation can also be configured to provide the Traffic Controller Outstation facility for a UTMC system.

In this mode the outstation is configured either as shown in Figure 14 or as shown in Figure 15. In both cases the OTU must be connected to a suitable network modem, usually via the CPU card Ethernet interface.

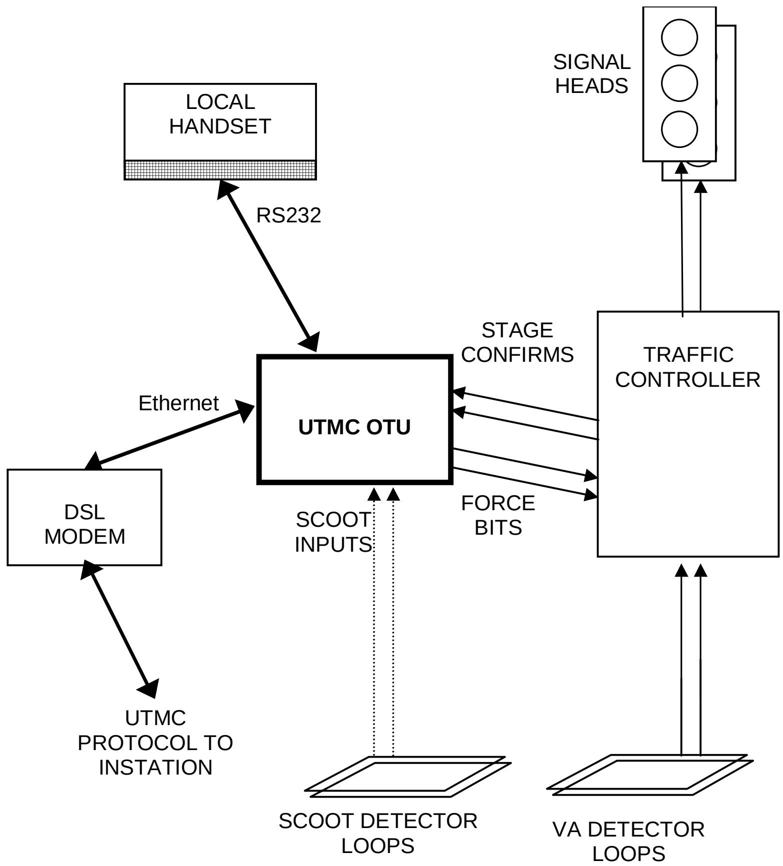


Figure 14 – Freestanding UTMC OTU Set-up

Figure 14 shows how a Freestanding UTMC OTU can be set up for Force Bit control. This type of set-up is used when the controller provides a UK standard UTC style interface. It shows the ‘Force Bits’ from the OTU being fed into the traffic controller, via the TR2210 (TR0141) UTC Interface. It also shows the ‘Stage Confirms’ coming back from the traffic controller to the OTU. For SCOOT applications inputs from specially positioned ‘flow’ detectors can also be interfaced to the unit.

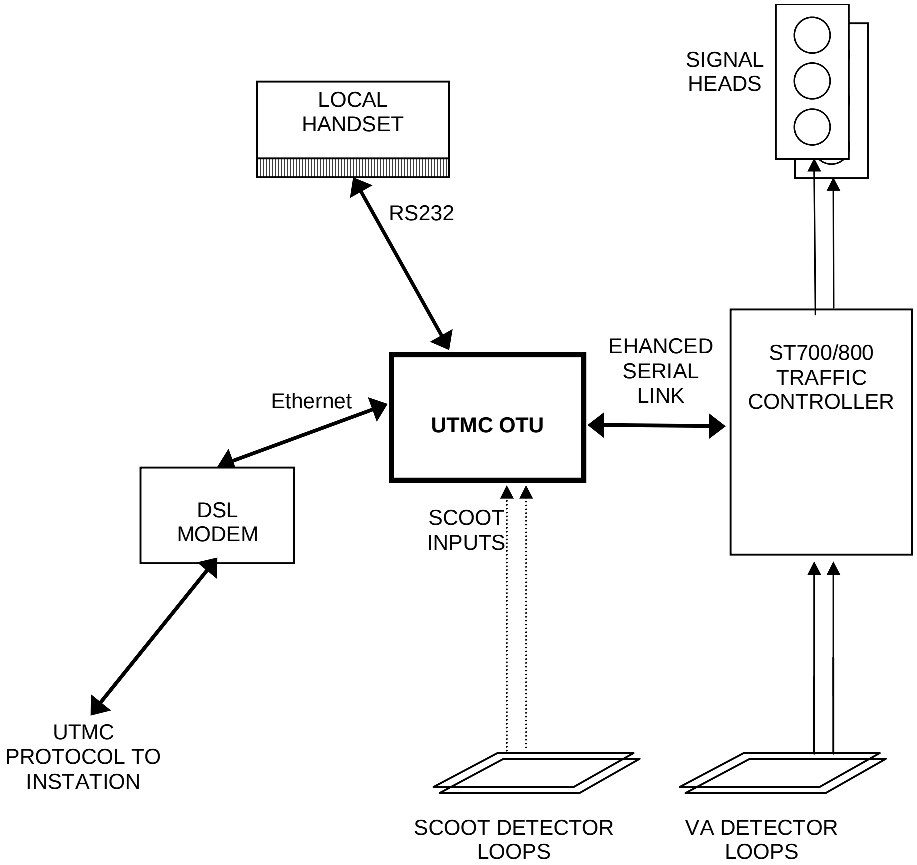


Figure 15 – ST800/700 Semi-Integral UTMC OTU Set-up

Figure 15 shows how an OTU can be set up for the ST800/700 Enhanced Serial Link control. It shows all the information being fed between the OTU and the traffic controller, via the ST800/700 Enhanced Serial Link. No I/O cards are required in this configuration.

Separate inputs on the CPU card are provided to permit connections for up to 8 associated SCOOT detectors. This requires cableform part number 667/1/30607/000.

The UTMC OTU facility requires the use of an STC supplied licence code in order to be activated. The licence code is based on the Processor PCB being used. See section 6.3, step 23 **on page 115.**

4.3.2 UTMC VMS Facility

The Outstation can be configured to provide an interface between a SIESpace Instation and up to 8 UVMS signs via an IP based network using the UTMC VMS system.

The following diagram (Figure 16) shows an example configuration of the UTMC VMS System:

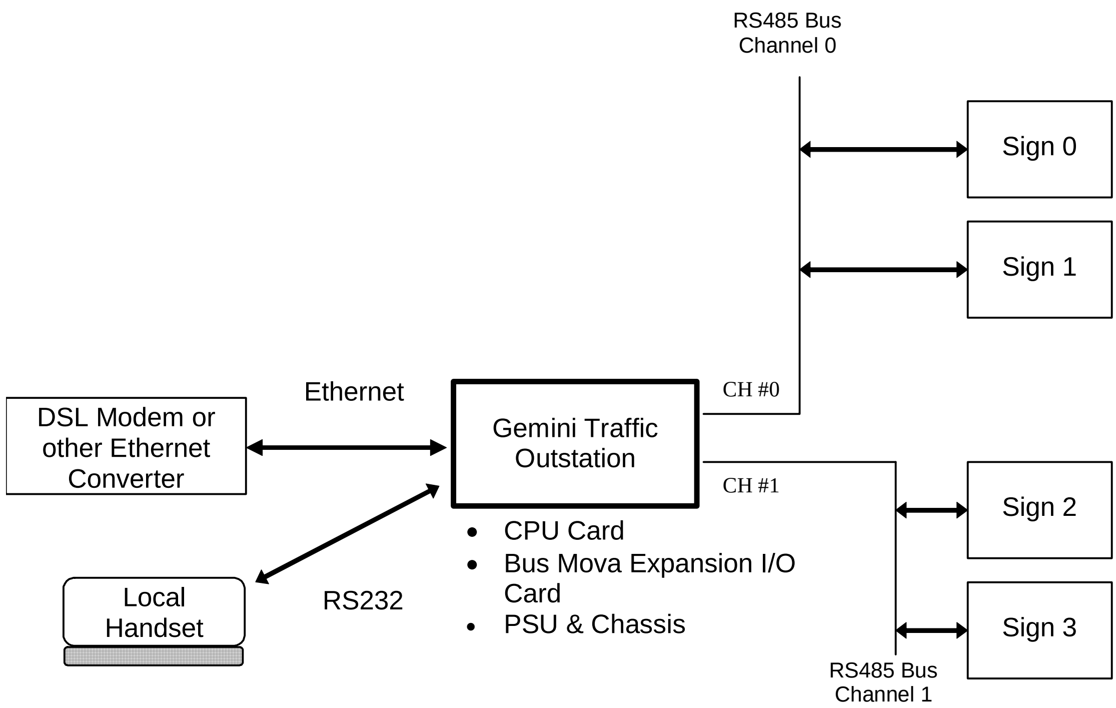


Figure 16 – UTMC VMS System Overview

When the Outstation is configured in UTMC VMS mode, UTMC VMS messages from the SIESpace Instation arrive via the Ethernet connection. The Outstation converts these messages into the SIESpace protocol and transmits them to the required sign via the RS485 Bus. The Outstation also collects status information from the VMS signs and this information can be integrated remotely via the UTMC VMS protocol over the Ethernet link.

The UTMC VMS facility requires the use of an STC supplied licence code in order to be activated. The licence code is based on the Processor PCB being used. See section 6.3, step 23 **on page 115.**

4.4 GSM OMCU

The GSM OMCU is an extension to the Siemens RMS OMCU described in section 4.2. It provides an extremely cost effective means to monitor and control equipment where standard PSTN connection is not available or where the line installation costs are prohibitive.

See Sections 2.1 and 2.6.2 for further details of the GSM option.

This has now been extended to provide a UMTS (3G) router option see 2.6.5 for more information.

4.4.1 Remote Monitoring

The GSM version provides all the facilities of a standard 3U OMCU and is capable of monitoring a wide variety of traffic signal and pedestrian controllers. The unit is configured from a RMS via a dial-up link to perform the monitoring and control functions required.

The UMTS version provides much the same functionality as the GSM version but via an always on IPsec VPN over a 3G cellular netwok link.

When a fault or other defined event is detected, it is logged at the unit and a call is made to the Instation to report the occurrence. If required, particular types of fault or event can be configured as “non urgent” so that these are logged but not reported to the Instation, unless a more urgent fault is detected or a call is made from the Instation.

Integral n+1 count units allow simple detector equipment to be used to monitor traffic flows, which are reported to the Instation automatically or on operator request.

Direct connection to a wide range of traffic controllers via their handset port allows an operator at the Instation to interrogate the controller remotely and make changes to the controller operation.

Variable Message Signs and access control equipment such as barriers may also be controlled.

4.4.2 Bus Priority and Access Control

When used for Bus Priority and access control applications, the GSM OMCU is able to connect up to 12 SIETAG readers using a suitable I/O board to provide logging, priority and access control functions.

Vehicles to be given access / priority are fitted with an electronic tag that may be programmed with, among other things, vehicle operator identification and individual vehicle number. A loop is located in each access lane, which is used by a SIETAG reader to interrogate tags as they pass over.

Data from the tags may be filtered by the GSM OMCU, which logs the information and can be programmed to output access requests to barriers or other equipment such as Traffic Controllers, via up to 16 isolated relay contacts. (These may be expanded up to 48 by the addition of extra I/O boards.)

Several levels of filtering may be configured from the Instation and downloaded to the GSM OMCU. Filtering options range from specific access or priority just for uniquely identified vehicles through to all vehicles of a particular operator. Access / priority may be restricted by time of day and individual or groups of vehicles may be blacklisted.

Bus Processor and OMCU functions can be performed simultaneously, limited only by the number of I/O boards that can be accommodated.

4.5 Ethernet OMCU

The OMCU may also be connected to the RMS instation via an Ethernet connection. Once an IP address has been assigned to the OMCU it can then be configured to operate as a Gemini OMCU with communication to the RMS instation across a network.

Initially the IP address must be setup manually using the IPM handset command to setup a static IP address and then IPR=2 to activate the IPM settings. This will most probably be done locally via the handset port, though it could be done remotely if a modem is fitted. Once the IP address has been assigned configuration data that designates the OMCU as an IP outstation can be downloaded from the instation and from that point the OMCU will operate as normal but via an Ethernet link.

5. INSTALLATION

WARNING

THIS EQUIPMENT MAY ONLY BE INSTALLED IN A RESTRICTED ACCESS LOCATION BY SIEMENS TRAFFIC CONTROLS OR BY TRAINED PERSONNEL.

AUTHORISED INSTALLER MUST ENSURE THAT INSTALLATION OF THIS EQUIPMENT DOES NOT INTERFERE OR DEGRADE THE DESIGN SPECIFICATION OF THE HOST EQUIPMENT IN ANY WAY WHATSOEVER.

ENSURE THAT THE UNIT IS NOT CONNECTED TO THE PSTN LINE DURING INSTALLATION AND SWITCH OFF ALL MAINS TO CABINET PRIOR TO STARTING.

THIS UNIT CONTAINS BATTERIES WHICH, UNDER FAULT CONDITIONS, MAY LEAK HAZARDOUS SUBSTANCES.

CARE MUST BE TAKEN WHEN FITTING BATTERIES OR HANDLING THE UNIT. FIT BATTERIES ONLY WITH SPECIFIED OR EQUIVALENT TYPE. BATTERIES FITTED INCORRECTLY COULD CAUSE AN EXPLOSION.

THE UNIT IS ONLY COMPLETELY DISCONNECTED AND ISOLATED FROM THE INCOMING MAINS SUPPLY WHEN THE MASTER SWITCH IN THE CONTROLLER IS TURNED TO THE OFF POSITION. REMOVING THE MAINS LEAD IS NOT SUFFICIENT.

During a unit change out, the Green Voltage Detector connections can be left intact on cableform 667/1/26586/000 that connects to the controller (as defined in section 5.6.3 which starts on page 91).

For Graphos see the Graphos Product Handbook 667/HB/31200/000 (Section 2.3 – Site Selection and Installation Guidelines) for the Installation Sequence.

5.1 INSTALLATION CHECK LIST

The checklist on the following pages should be used to install the unit together with the Instation computer printout for the equipment to be monitored. For further guidance on each step refer to the appropriate section in the REFERENCE column. 'WORKS ORDER' indicates that the relevant Works Order or Works Specification should be consulted.

Installation techniques are shown on drawing 667/GA/26577/000 in Appendix B.
For GSM OMCU installation, see also 667/GA/32600/002 in Appendix B.

The checklist should be followed in sequence unless a particular step is not required. Refer to the relevant column (OMCU, C/P [Car Park Count O/S], BUS [Processor], MOVA, VC [Vehicle Classifier], UTMC OTU and UTMC VMS) to determine whether the step applies to the application or applications that are required. For example, if the unit is to perform both OMCU and Bus Processor facilities, then all activities in both the 'OMCU' and 'BUS' columns should be undertaken.

5.1.1 Users Responsibilities

It is the responsibility of the user (or purchasing authority) to:

(a) Provide a Telephone connection (if PSTN connection with the unit is required).

(b) If the unit is to be installed within an existing controller – ensure that adequate space is available for mounting the unit (dimensions are given in section 2.1) and fixings are available. An ancillary outer-case will be required if space is not available (see section 5.7 on page 100).

(c) Provide at least one auxiliary mains supply or suitable alternative mains supply outlet for the unit's power supply (supply capability to be at least 1A RMS, and limited to a maximum of 6A). For a UTMC application a second mains supply outlet is required for the associated DSL modem power unit. A suitable disconnect device must be provided for this supply.

(d) For the GSM Option, arrange the following:
  i) Ensure that good GSM coverage is available at the point where the aerial will be mounted.
  ii) Arrange the airtime agreement and SIM card for the GSM modem. The SIM should be configured 'Data only' and **must not** have the PIN enabled. For details see section 2.6.2.

5.1.2 UTMC OTU Installation Prerequisites

Note that modem facilities are dependent upon the customer's implementation.

(a) The modem may be DSL, Fibre, or Radio, and all that is required is that it presents an Ethernet port. The need for a modem shelf and modem power supply socket will also be dependent on the customer's requirements and should be confirmed when an order is placed for UTMC OTUs.

(b) For 19" Rack Version the following parts apply:

667/1/31600/019 Gemini OTU including 19" rack and 3 prewired detector backplanes.
667/1/31625/019 Modem Shelf 2U to fit 19" rack
667/1/31620/000 Modem supply socket including RCD (only available if modem rack called up)

(c) For 11" Rack Version the following parts apply:

667/1/31600/011 Gemini OTU including 11" rack and 3 prewired detector backplanes.
667/1/31625/011 Modem Shelf 2U to fit 11" rack
667/1/31620/000 Modem supply socket including RCD (only available if modem rack called up)

(d) A maximum of 3 off blanking plate kits 667/1/31614/000 or ST4R Detectors 667/1/27663/000 or any combination thereof are also required. That is:

If there are no detectors, 3 off blanking plates are required.
If there is one detector, 2 off blanking plates are required.
If there are two detectors, 1 off blanking plate is required.
If there are three detectors, no blanking plates are required.

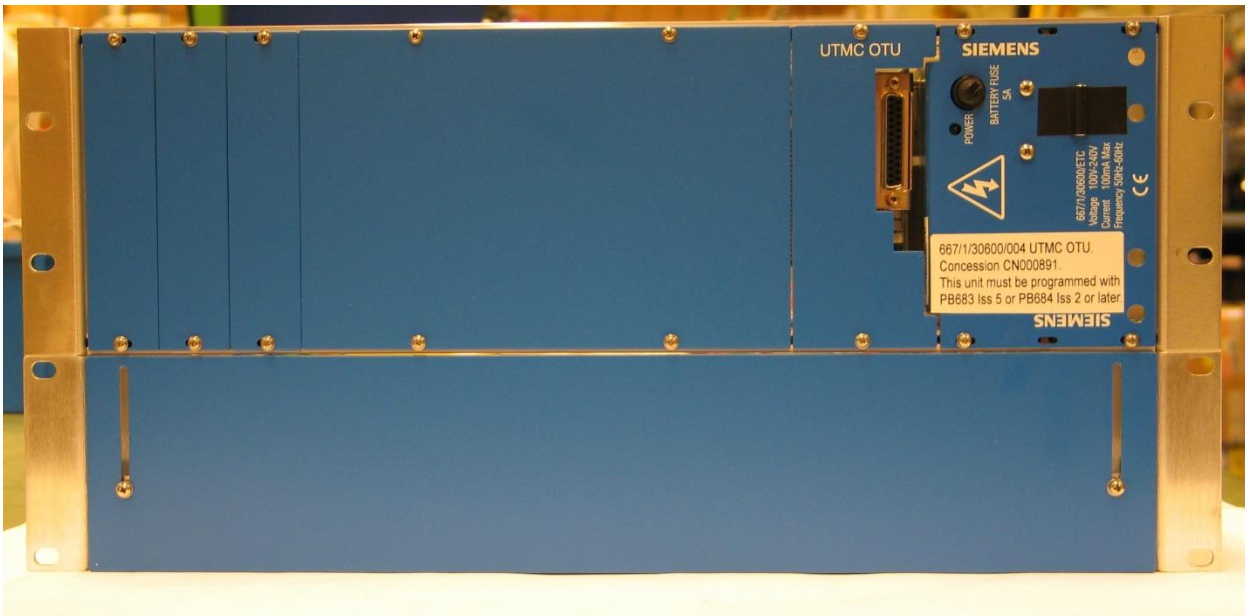
If you remove the main rack blanking plate on a 19" rack (in order to fit more than 3 detector backplanes) you will need to order and install blanking plates to fill unused positions in the rack. A total of 7 blanking plates, minus the number of backplane/detector card combinations fitted, will be needed.

NB: The outputs from detectors are pre-wired to Outstation digital inputs, starting from digital input 17 onward.

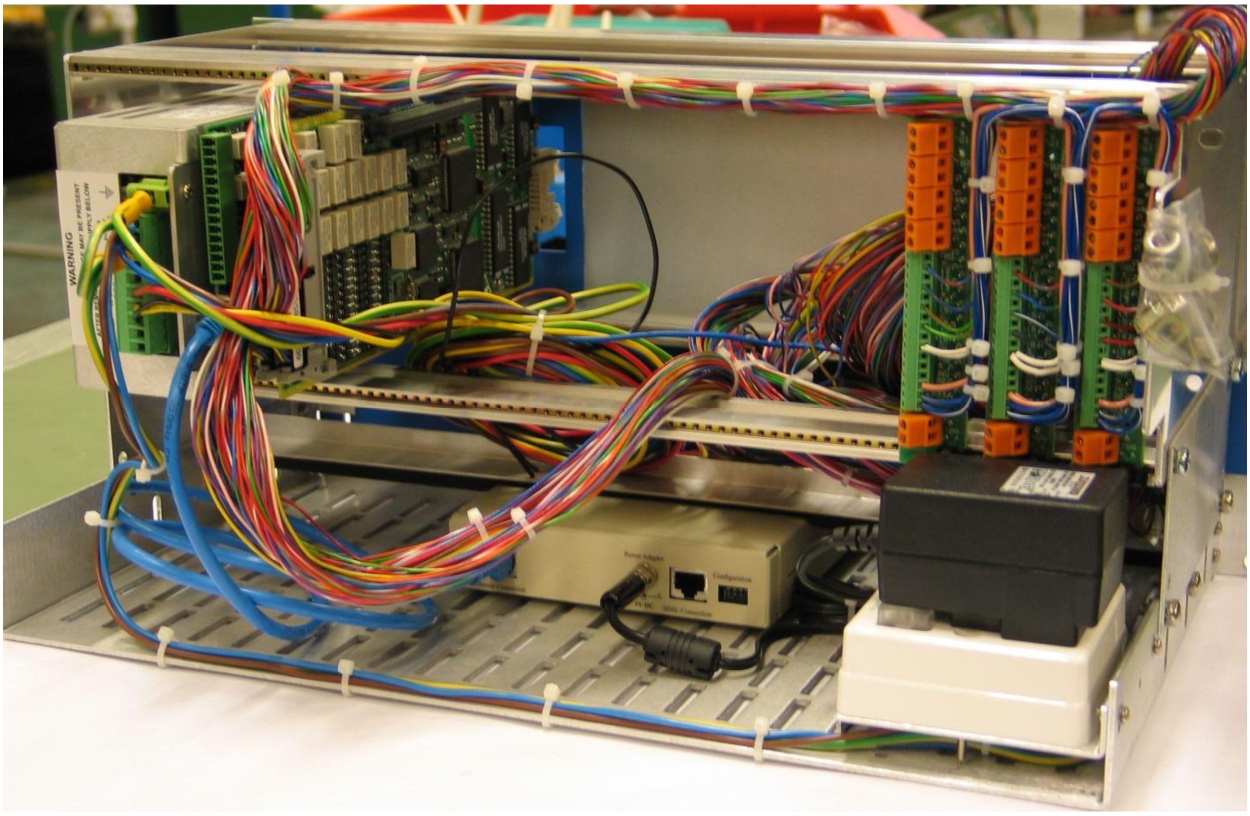
(e) The 11" rack can only support the 3 detector backplanes currently available. The 19" rack can support up to 7 backplanes.

(f) A supply for the detectors is required either from the controller or a standalone detector supply kit. For example, a standard STC 24 AC detector supply kit may be fitted, which will supply at least 15 Detector cards - 667/1/20292/008.

(g) For the semi-integral UTMC OTU, any loops required for SCOOT, N+1 count, or occupancy should be wired directly to the Gemini unit, rather than via the STC controller.



Front of UTMC OTU with 2U modem shelf and detector blanking panels



Rear of UTMC OTU with 2U modem shelf (earlier metalwork), modem, modem power supply, and supply socket fitted

5.1.2.1 UTMC OTU Default Digital I/O Connections

Pin	Wire Colour	Board 1 PL1	Board 1 PL2
1	Blue	Reply Bit 1	Detector 9
2	Yellow	Reply Bit 2	Detector 10
3	Brown	Reply Bit 3	Detector 11
4	Violet	Reply Bit 4	Detector 12
5	Orange	Reply Bit 5	Spare input
6	Slate	Reply Bit 6	Spare input
7	Pink	Reply Bit 7	Spare input
8	Red / Blue	Reply Bit 8	Spare input
9	Red / Green	Reply Bit 9	Spare input
10	Red / White	Reply Bit 10	Spare input
11	Red / Brown	Reply Bit 11	Spare input
12	Red / Orange	Reply Bit 12	Spare input
13	Red / Slate	Reply Bit 13	Spare input
14	Blue / Green	Reply Bit 14	Spare input
15	Blue /	Reply Bit 15	Spare input
16	Blue / Brown	Reply Bit 16	Spare input
17	Blue / Orange	Detector 1	Spare input
18	Blue / Slate	Detector 2	Spare input
19	Green / Orange	Detector 3	Spare input
20	Green / Brown	Detector 4	Spare input
21	Green / Slate	Detector 5	Do Not Use
22	Brown / Slate	Detector 6	Do Not Use
23	Orange / Brown	Detector 7	Do Not Use
24	Orange / Slate	Detector 8	Do Not Use
25	White	Input 0V	Input 0V
26	White	Input 0V	Input 0V
27	Blue	Control Bit 1 n/open	Control Bit 9 n/open
28	Yellow	-	-
29	Brown	1 common	9 common
30	Violet	Control Bit 2 n/open	Control Bit 10 n/open
31	Orange	-	-
32	Slate	2 common	10 common
33	Pink	Control Bit 3 n/open	Control Bit 11 n/open
34	Red / Blue	-	-
35	Red / Green	3 common	11 common
36	Red / White	Control Bit 4 n/open	Control Bit 12 n/open
37	Red / Brown	-	-
38	Red / Orange	4 common	12 common
39	Red / Slate	Control Bit 5 n/open	Control Bit 13 n/open
40	Blue / Green	-	-
41	Blue /	5 common	13 common
42	Blue / Brown	Control Bit 6 n/open	Control Bit 14 n/open
43	Blue / Orange	-	-
44	Blue / Slate	6 common	14 common
45	Green / Orange	Control Bit 7 n/open	Control Bit 15 n/open
46	Green / Brown	-	-
47	Green / Slate	7 common	15 common
48	Brown / Slate	Control Bit 8 n/open	TC n/open (optional)
49	Orange / Brown	-	-
50	Orange / Slate	8 common	TC common

NB: The wire colours above relate to the cable form 667/1/26585/005

INSTALLATION CHECKLIST

STEP	OMCU	C/P	BUS	MOVA	FUNCTION	REFERENCE
1	OMCU	C/P	BUS	MOVA	Check unit supplied is as per installation computer print out	WORKS ORDER
2	OMCU	C/P	BUS	MOVA	Check unit contains correct I/O boards. **Ensure LMU I/O boards are issue 3 or later if fitted with Bus/MOVA boards.**	WORKS ORDER
3	OMCU	C/P	BUS	MOVA	Check unit has the correct firmware loaded into the FLASH memory.	WORKS ORDER
4	OMCU	C/P	BUS	MOVA	Set up board address switches	5.2.1
5	OMCU	C/P	BUS	MOVA	Set up modem power selection	5.2.2
6	OMCU	C/P	—	—	Set up 50/60Hz operation selection	5.2.3
7	OMCU	—	—	—	Set up 120/230V AC operation selection	5.2.4
8	—	—	BUS	—	Set up RS485 terminating resistors	5.2.5
9	—	—	BUS	MOVA	Set up Bus/MOVA (Digital) output relay resistors	5.2.6
10	OMCU	—	—	—	50V-0-50V voltage monitor required?	5.2.7
11	OMCU	C/P	BUS	MOVA	Switch the RAM battery on and confirm the watchdog link is correctly installed	5.2.8
12	OMCU	C/P	BUS	MOVA	Install unit and connect safety earth lead to cabinet earth point	5.3 to 5.5
13	OMCU	—	—	—	Connect serial linked Gemini	5.6.1
14	OMCU	—	—	—	Connect lamp current sensors (Unless using ST800/700 enhanced serial link)	5.6.2.1
15	OMCU	—	—	—	Connect lamp supply sensor (Unless using ST800/700 enhanced serial link)	5.6.2.2
16	OMCU	C/P	—	—	Connect mains voltage / 3RD Party ELV AC detector cableforms	5.6.2.3
17	OMCU	C/P	—	—	Connect digital monitors cables (Unless using ST800/700 enhanced serial link)	5.6.2.4
18	—	—	BUS	—	Connect CPU & Bus Processor digital I/O	5.6.3
19	—	—	BUS	—	Connect RS485 cables, e.g. for SIETAG	5.6.4
20	—	—	—	MOVA	Connect MOVA digital I/O cables (Unless using ST800/700 enhanced serial link)	9.2 & 9.3
21	—	—	—	MOVA	Step deleted	
22	OMCU	C/P	BUS	MOVA	Complete post installation check	5.6.6
23	OMCU	C/P	BUS	MOVA	Identify all connectors/cable forms	5.6.7
24	OMCU	C/P	BUS	MOVA	Connect all connectors to the unit	–
25	OMCU	—	—	MOVA	Connect 141 cable to controller handset port (req'd for MOVA if using ST800/700 link)	5.6.8
26	—	—	BUS	—	Connect 141 cable to OTU handset port (req'd for BUS if using OTU link)	5.6.9
27	OMCU	C/P	BUS	MOVA	Connect the unit to mains outlet	5.6.10
28	OMCU	C/P	BUS	MOVA	Restore controller and unit mains supply	–
29	OMCU	C/P	BUS	MOVA	Switch on unit supply	–
30	OMCU	C/P	—	—	Connect unit support battery	5.6.11
31	OMCU		BUS	—	Commission the OMCU / BUS applications	6
32	—	C/P	—	—	Commission the Car Park Count unit	6
33	—	—	—	MOVA	COMMISSION THE MOVA APPLICATION	9.5

INSTALLATION CHECKLIST (contd.)					
STEP	**VC**	**UTMC OTU**	**UTMC VMS**	**FUNCTION**	**REFERENCE**
1	VC	OTU	VMS	Check unit supplied is as per installation computer print out	WORKS ORDER
2	VC	OTU	VMS	Check unit contains correct I/O boards. **Ensure LMU I/O boards are issue 3 or later if fitted with Bus/MOVA boards.**	WORKS ORDER
3	VC	OTU	VMS	Check unit has the correct firmware loaded into the FLASH memory.	WORKS ORDER
4	VC	OTU	VMS	Set up board address switches	5.2.1
5	VC	OTU	VMS	Set up modem power selection	5.2.2
6	—	—	—	Set up 50/60Hz operation selection	5.2.3
7	—	—	—	Set up 120/230V AC operation selection	5.2.4
8	VC	—	VMS	Set up RS485 terminating resistors	5.2.5
9	—	—	—	Set up Bus/MOVA output relay resistors	5.2.6
10	—	—	—	50V-0-50V voltage monitor required?	5.2.7
11	VC	OTU	VMS	Switch the RAM battery on and confirm the watchdog link is correctly installed	5.2.8
12	VC	OTU	VMS	Install unit and connect safety earth lead to cabinet earth point	5.3 to 5.5
13	—	—	—	Connect serial linked Gemini	5.6.1
14	—	—	—	Connect lamp current sensors (Unless using ST800/700 enhanced serial link)	5.6.2.1
15	—	—	—	Connect lamp supply sensor (Unless using ST800/700 enhanced serial link)	5.6.2.2
16	—	—	—	Connect mains voltage / 3RD Party ELV AC detector cableforms	5.6.2.3
17	VC	—	—	Connect digital monitors cables (Unless using ST800/700 enhanced serial link)	5.6.2.4
18	VC	OTU	VMS	Connect CPU & Bus Processor digital I/O	5.6.3
19	VC	—	VMS	Connect RS485 cables, e.g. for SIETAG	5.6.4
20	—	—	—	Connect MOVA digital I/O cables (Unless using ST800/700 enhanced serial link)	9.2 & 9.3
21	—	OTU	—	Connect SCOOT, count and occupancy detectors	5.1.2(g)
22	VC	OTU	VMS	Complete post installation check	5.6.6
23	VC	OTU	VMS	Identify all connectors/cable forms	5.6.7
24	VC	OTU	VMS	Connect all connectors to the unit	–
25	—	—	—	Connect 141 cable to controller handset port (req'd for if using ST800/700 link)	5.6.8
26	—	—	—	Connect 141 cable to OTU handset port (req'd for BUS if using OTU link)	5.6.9
27	VC	OTU	VMS	Connect the unit to mains outlet	5.6.10
28	VC	OTU	VMS	Restore controller and unit mains supply	–
29	VC	OTU	VMS	Switch on unit supply	–
30	VC	OTU	VMS	Connect unit support battery	5.6.11
31	—	—	—	Commission the OMCU / BUS applications	6
32	—	—	—	Commission the Car Park Count unit	6

INSTALLATION CHECKLIST (contd.)					
STEP	VC	UTMC OTU	UTMC VMS	FUNCTION	REFERENCE
33	—	—	—	COMMISSION THE MOVA APPLICATION	9.5
34	VC	—	—	Commission the Vehicle Classifier unit	6.3
35	—	OTU	—	Commission the UTMC OTU unit	6.3
36	—	—	VMS	Commission the UTMC VMS unit	6.3

THE REST OF SECTION 5 TAKES YOU THROUGH THE STEPS IN THE INSTALLATION CHECKLIST (FROM THE PREVIOUS PAGES) IN MORE DETAIL…

Section 5.2 takes you through the steps that 'configure' the hardware before the unit it is installed.

Sections 5.3, 5.4 and 5.5 take you through the steps to install the unit.

And finally, section 5.6 takes you through all the steps involved in connecting up all the various interfaces to the unit.

5.2 SET-UP

Applicable To: **OMCU, C/P, Bus, MOVA, VC, UTMC OTU & UTMC VMS**

STEP	FUNCTION	REFERENCE
1	Check unit supplied is as per installation computer print out	WORKS ORDER
2	Check unit contains correct I/O boards. **Ensure LMU I/O boards are issue 3 or later if fitted with Bus/MOVA boards.**	WORKS ORDER
3	Check unit has the correct firmware loaded into the FLASH memory.	WORKS ORDER

The unit, prior to its installation and commissioning, requires configuring for the type of application, either on site or at a depot.

The hardware has a number of options as follows, which require selection before power is applied to the unit…

5.2.1 I/O Board Position Selection (All Board Types)

Applicable To: **OMCU, C/P, Bus, MOVA, VC, UTMC OTU & UTMC VMS**

4	Set up board address switches	5.2.1

Each LMU I/O board has a 4-way DIL switch S1 and each Bus MOVA I/O (Digital I/O) board has two 2-way DIL switches S5 and S6.

Three of these four switches provide the I/O board with its own unique address within the Outstation unit.

Caution ***On each I/O board, only one of the three board address switches should be in the 'ON' position while the unit is powered.***

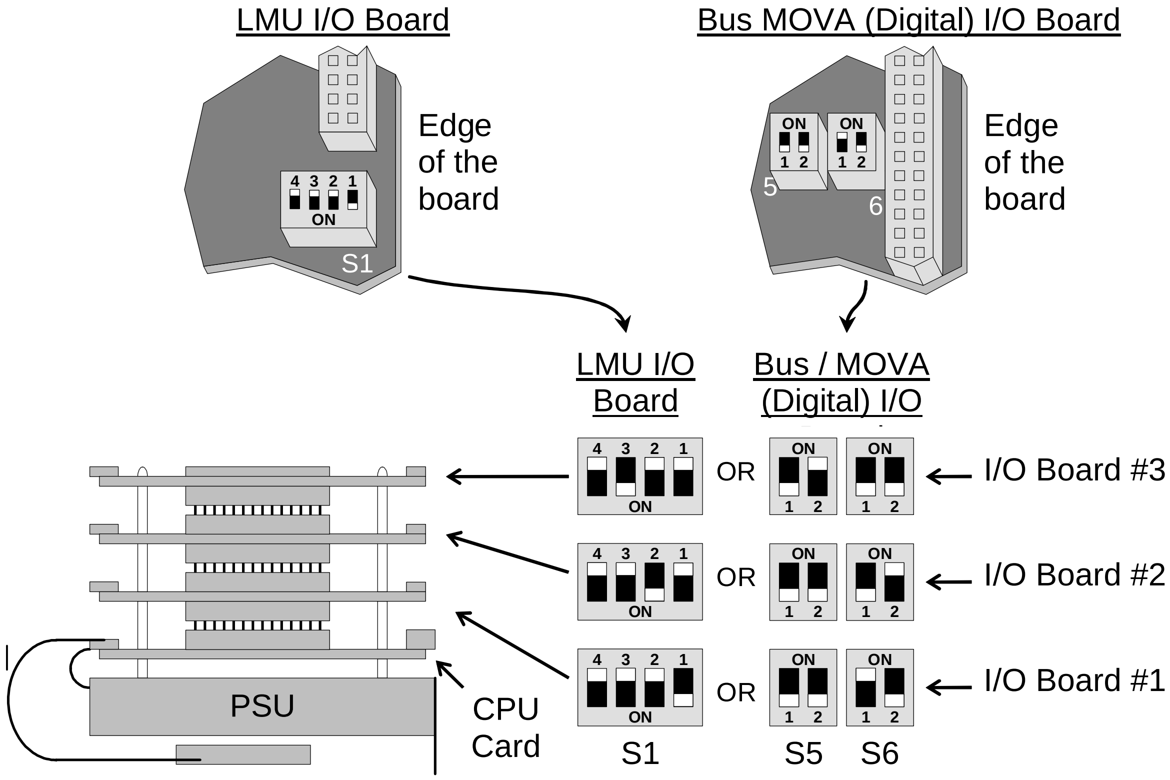


Figure 17 – I/O Board

Switch position 4 of S1 on the LMU I/O board is used for switching the lamp monitor between 50Hz and 60Hz operation (OFF = 50Hz, ON = 60Hz), see section 5.2.3.

5.2.2 Modem Power Supply Selection (All Board Types)

Applicable To: **OMCU, C/P, Bus, MOVA, Vehicle Classification, UTMC OTU & UTMC VMS**

5	Set up modem power selection	5.2.2

The Processor card normally provides the modem power. Two voltage supplies are available on this card 5V (400mA) and 12V (1000 mA). If required an 8V (300mA) supply is available on the LMU I/O, Bus/MOVA I/O and Digital I/O cards.

Check which supply is required by the modem using the Modem Supply List shown on 667/GA/32600/000 Sheet 2 in Appendix B.

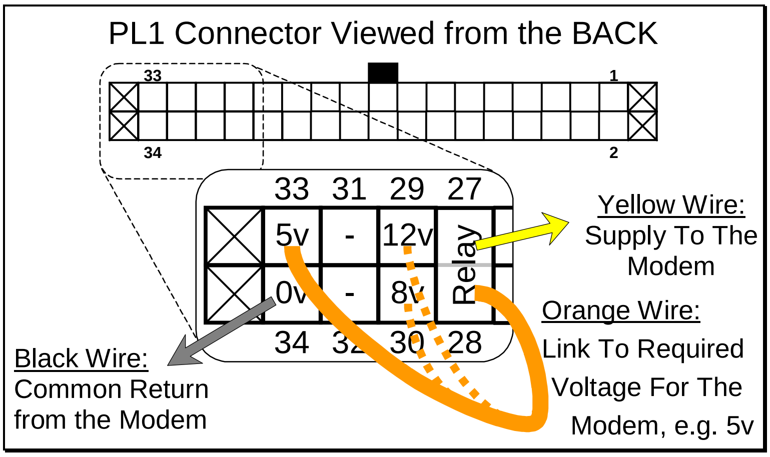
On the **Processor board**, insertion of the modem power lead into the relevant connector socket in the Modem Power connector PL3 selects which supply to use as follows.

Modem Type	Cableform Position	Voltage Supply
Dynalink PKS-5600-A-P/M	PL3 socket 3	5V Supply
GPRS/GSM TC35	PL3 socket 2	12V Supply
	PL3 socket 1	0V Supply

On the **LMU I/O board**, insertion of the modem power lead into the relevant connector socket in the LMU analogue connector PL1 selects which supply to use as follows. The orange link wire connects to the first relay on the board, which is used to control power to the modem as part of its initialisation sequence.

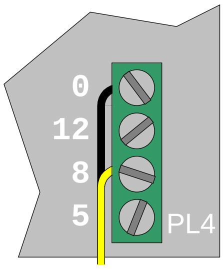
Cableform Position	Voltage Supply	Wire colour of power cable
PL1 socket 27	Supply to Modem	Yellow wire
PL1 socket 28	Link (see below)	Orange wire
PL1 socket 29*	12V Supply	Orange wire (if 12V required)
PL1 socket 30	8V Supply	Orange wire (if 8V required)
PL1 socket 33*	5V Supply	Orange wire (if 5V required)
PL1 socket 34	Common Return	Black wire

* - This supply voltage is normally provided by the Processor card.



For Example:
To select 5V as the modem power supply:

1) Insert the black wire into socket 34 for 0V.
2) Insert the orange link wire into sockets 28 and 33 to select 5V.
3) Finally insert the yellow wire into socket 27 (Modem +ve supply).



On the **BUS / MOVA (Digital) I/O board**, the modem power is available on a separate connector PL4 which is located near the front right-hand corner of the board. The orange wire is not required as the necessary power switching for use during initialisation is built into this board. If the modem power leads are fitted with berg crimps, then the crimps should be cut approximately in half to form a bullet which can be inserted into this connector.

As with the LMU I/O card, the 12V and 5V connections are not normally used.

IMPORTANT

Before connecting the plug into the modem with the unit powered up, check with a multi-meter that the correct power supply selection has been made.

5.2.3 50/60 Hz Operation

Applicable To: **OMCU and C/P**

6	Set up 50/60Hz operation selection	5.2.3

The Outstation can operate with 50Hz or 60Hz mains' supplies, for export purposes. The mains timing reference circuit is provided by the Outstation power supply unit in most applications.

If the Processor PCB is added as an upgrade to an old style OMCU, then refer to section 5.8 for further details.

5.2.4 120/230V AC Operation

Applicable To: **OMCU only**

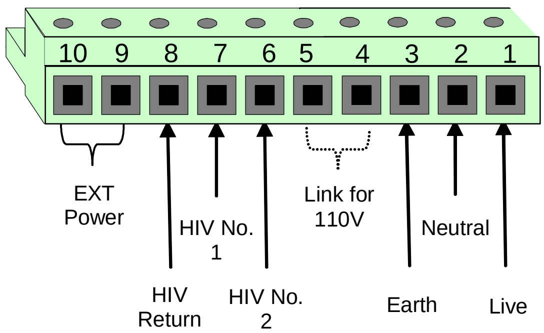
7	Set up 120/230V AC operation selection	5.2.4

If the Outstation is connected to a 110V/120V supply then a wire link is required on the supply input connector (PL1 on supply unit) between pins 4 and 5 to provide the correct mains timing reference for ZXO.

The power supply itself operates from 85V to 265V AC and therefore needs no further modification.

PSU Connectors

PSU Connector Pinout 5-1



Note 1: Connection to these two inputs is only necessary if there is no associated LMU I/O card.
Note 2: High voltage inputs 1 and 2 replace the function of inputs 1 and 2 of the first LMU I/O card.
Note 3: The state of these inputs can be displayed using the MSI 0 command (see section 13.4).
Note 4: To connect the High Voltage input 2 on an ELV controller - allowing a Serial OMU to report Lamp Supply status to the RMS Instation if the serial link to the controller fails or is unplugged - see ELV Lamp Supply Monitor Kit 667/1/32612/000 (details on drawing 667/GA/32612/000).

Connector Position	Wire Colour	Description
1	Brown	Mains supply live
2	Blue	Mains supply Neutral
3	Green / Yellow	Mains supply Earth
4		Link to 5 for 110V working
5		Link to 4 for 110V working
6	Red	High voltage I/P No. 2 for Lamp Supply Monitoring (see Notes. Not to be connected when using the 3RD Party ELV AC LMU I/O Board)
7	Yellow	High voltage I/P No. 1 for Controller Main monitoring (not normally used for ST800/700) (see Notes)
8	Black	High voltage I/P Return (Neutral)
9		External Power (GND)
10		External Power (13.8V)

Before applying the mains' power, recheck the correct voltage setting has been selected for the Zero Crossover Mains' Input (ZXO Mains I/P).

If 120V operation is required then a different variant of the Voltage Monitor Transformer must be used. The 100V Welsh Office version is 667/7/25172/500, see section 5.2.7. A design for a 120V version would need to be requested.

5.2.5 RS485 Terminating Resistors (BUS / MOVA I/O Board Only)

Applicable To: **OMCU, VC & UTMC VMS**

8	Set up RS485 terminating resistors	5.2.5

RS485 communication channels must be correctly terminated to allow reliable operation. The termination load of each channel on the Bus / MOVA I/O board can be set up using a number of switches as defined below.

Channel	Switch Settings	Term' Load	Switch Settings	Term' Load	Switch Settings	Termination Load
1	S2/1 on S2/2 on	60Ω	S2/1 on S2/2 off	120Ω	S2/1 off S2/2 off	Not Terminated
2	S4/1 on S4/2 on	60Ω	S4/1 on S4/1 off	120Ω	S4/1 off S4/2 off	Not Terminated
3	S3/1 on S3/2 on	60Ω	S3/1 on S3/2 off	120Ω	S3/1 off S3/2 off	Not Terminated
4	S1/1 on S1/2 on	60Ω	S1/1 on S1/2 off	120Ω	S1/1 off S1/2 off	Not Terminated

The total termination impedance (the ‘sum’ of both ends) for each channel should be 60Ω. For links up to 250m the I/O board can provide the total termination. If a longer link is required, the far end of the link should be terminated with 120Ω and the I/O board set to only provide a 120Ω termination.

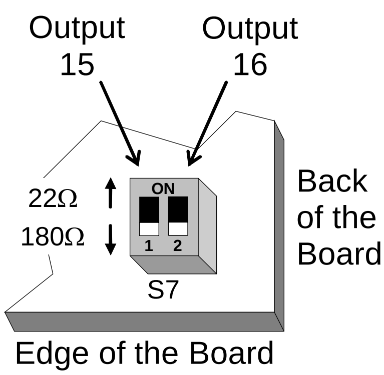
The total termination impedance must be calculated, based on the terminal impedance provided by all other equipment connected to the communication channel. So in some circumstances, where termination is provided by that equipment, the I/O board may need to be set to ‘not terminated’ (no resistors selected).

5.2.6 Output Resistor Options (BUS / MOVA & Digital I/O Boards Only)

Applicable To: **Bus, MOVA & UTMC VMS**

9	Set up Bus/MOVA (Digital) output relay resistors	5.2.6

The BUS / MOVA and Digital I/O boards have two switches to select the resistor values on the last two outputs:



The first switch selects the resistor values for output 15, while the second switch selects the resistor value for output 16.

The ‘ON’ position selects 22Ω, while ‘OFF’ selects the normal 180Ω. Unless 22Ω is specifically required, the 180Ω position should be selected.

5.2.7 Welsh Office 50V – 0 – 50V Working (LMU I/O Board Only)

Applicable To: **OMCU Only**

10	50V-0-50V voltage monitor required?	5.2.7

To set the OMCU to work on the Welsh Office 50V-0-50V system, a different variant of the Voltage Transformer 667/7/25172/500 is required. Also the current sensor 667/7/25171/000 is limited to half the normal number of lamps.

Note: The 3RD Party ELV AC LMU I/O Board does not accept mains voltages of any kind and cannot be used for this application.

5.2.8 RAM Battery Back-Up

Applicable To: **All Products**

11	Switch the RAM battery on and confirm the watchdog link is correctly installed.	5.2.8

RAM Battery

The processor board has a Lithium Coin Cell battery fitted to support the RAM and Real Time Clock during periods of mains' failure. When dispatched from the factory this battery has a small piece of film inserted between itself and the associated holder. This must be 'pulled out' to enable the battery to function.

Watchdog link

Ensure the watchdog link is correctly installed across pins 1 and 2 of PL6 on the processor board.

5.3 INSTALLATION INTRODUCTION

Applicable To: **All Products**

12	Install unit and connect safety earth lead to cabinet earth point	5.3 to 5.5

A standard hardware installation, in terms of location and cable routing, is not possible, as different manufacturer's cabinets differ in size, model and occupancy. Use of the following guidelines provides a level of standardisation. Any new controller that is not covered in this handbook will require the form 667/ST/17500/000 to be completed and returned to Poole Engineering to ensure that BS5750 and approval requirements are met. (A copy of this document is available from Siemens Poole when required.)

5.4 HARDWARE INSTALLATION

5.4.1 General Installation

The unit assembly is a 3U extended unit, requiring 192mm of 3U Rack space. This feature, together with the configurable cableforms, provides sufficient flexibility to install the hardware in most controllers, in one of the three positions described below. Also see Appendix B for details of part numbers.

(a) The unit may occupy unused space, in a suitable rack with sufficient space, which exists in a controller's cabinet. See bottom half of 667/GA/26577/000 drawing in Appendix B.

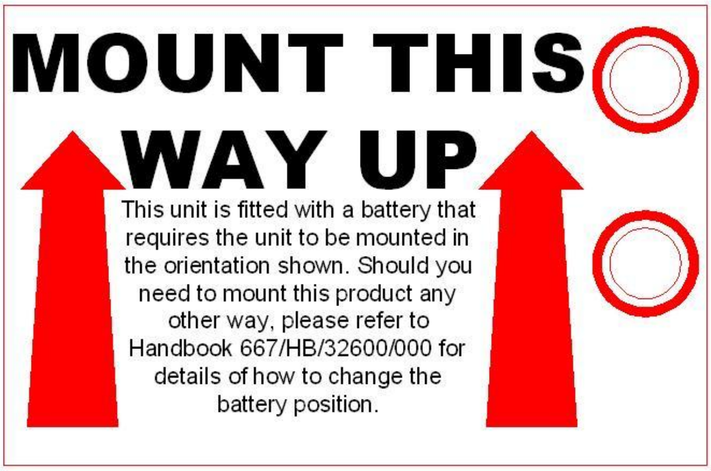
(b) If no suitable rack space exists as in (a), the unit rack mounting facility can be used (the M6 screws in rack angles) to allow the unit installation. See top half of 667/GA/26577/000 drawing in Appendix B.

(c) If all fails, then an alternative suitable method should be adopted, with the collaboration of Poole Engineering using form 667/ST/17500/000 as defined in section 5.3, or use an Additional Outercase. If the Additional Outercase method is used, then additional installation work is required (see section 5.7 on page 100).

(d) If the unit is to be mounted in such a way that the 'Battery Warning Label' is visible on the bottom of the unit then the following modifications are necessary. This is to ensure that the battery is not operating upside down.

- Ensure the Battery Fuse is **not installed**;
- Temporarily dismantle the power supply unit;
- Remove the metal cover (NB Do not remove any modem attached to this cover);
- Disconnect the battery connection leads;
- Cut away the Battery retention tywraps;
- Rotate the battery through 180 degrees;
- Re-secure the battery using new tywraps, ensuring that the other set of 4 holes is used. (See 667/GA/32600/000)
- Replace the cover;
- The Outstation is now ready for installation.

The unit is shipped with a label affixed to the front panel which clearly identifies the battery terminal orientation, see below. This label should be removed when the unit has been installed. If the arrows on the unit would point downwards after installation, the battery must be rotated as detailed above.



The Outstation comes in a number of basic units depending on the required communication system:

- with PSTN Modem 667/1/32600/001
- with GSM Modem 667/1/32600/002 – Pole mounted antenna
- with Car Park 667/1/32600/003
- with UTMC 667/1/32600/004
- with GSM Modem 667/1/32600/005 – Case mounted antenna

These part numbers provide a GEMINI^2 PSU (complete with LGD battery) together with a GEMINI^2 Processor card and 0141 cable. The Basic Unit may require further Expansion kits (either LMU I/O cards and/or Bus/MOVA (Digital) I/O cards) to support the required application. Before the Outstation can be installed, these expansion kits require assembling to the Basic Unit. To assemble these expansion kits to the Basic unit, use the methods and Items Lists on General Assembly drawing 667/GA/32600/000 in Appendix B.

The following are important points to remember during assembly and installation when the Outstation is fitted with LMU I/O boards:

- Ensure that the rear cables (High Voltage and Low Voltage), are connected to their monitoring points and plugged into the unit, before installing the unit into the Rack or Cabinet.
- If applicable – ensure that the Mains' feed from the PSU assembly to the High Voltage cable form is connected for the correct voltage; see section 5.2.4, which starts on page 74.
- Ensure that the voltage protection covers on the I/O board or boards are fitted and securely fixed.

5.4.2 Radio Clock Installation

[This section only applies to Bus applications]

The optional Radio Clock is a separate unit that is mounted external to the Outstation using a bracket supplied with the unit. It provides a time signal to the traffic outstation received from the MSF Rugby transmitter. This is used to synchronise the internal real time clock.

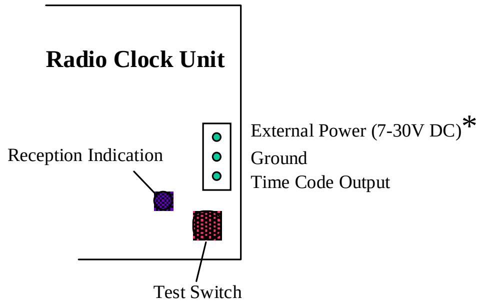
The system has good tolerance to interference and only requires valid reception for a few minutes each day to maintain the accuracy of the clock. It is however a sensitive radio receiver operating at 60 KHz (for Rugby MSF transmissions) and certain precautions are necessary.

- It should not be located near to radio transmitters.
- It should be kept as far away as practicable from a SIETAG reader or vehicle detector loops. In some cases detector loops might have to be set to operate on different channels as they can radiate at the same frequency as the Rugby transmitter.
- It must be orientated correctly to point towards the Rugby transmitter. See below and also see 'RCS' on page 251 for details on the use of the handset for verifying radio reception.

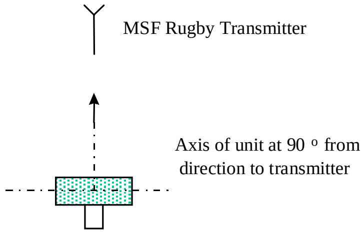
Cabling to the Radio Clock should be separate from other intersection cables, particularly detector loop feeders, to avoid electrical noise being injected into the Radio Clock via its supply. A screened cable is recommended.

The Radio Clock is required to be connected to a digital input on either the Processor or the Bus / MOVA (Digital) I/O Boards (defined during the configuration process) and to signal ground. The current version of the radio clock derives power from its internal battery and no additional power connection is required. Earlier versions (with 3-core connection cable) require an external supply, which may be derived from the Processor

Modem Supply (PL3 pin2 [+12V] and PL3 pin3 [0V. If the I/O cable 667/1/26585/010 is used then a dedicated supply connection is provided.



Internal Connections for the Radio Clock



Correct Orientation for the Radio Clock

* External power not required on later models.

Figure 18 – Radio Clock Unit

5.5 CABLE AND WIRING

Applicable To: **All Products**

It is not possible to adopt a standard cable routing, as mention in 5.1, but the following guidelines should be adhered to:

(a) Secure all cables to the controller frame or other suitable locations.
(b) Cables should not obstruct the maintenance work on the controller, the unit being installed, or any other equipment fitted within the cabinet.

5.6 INTERFACING

Applicable To: **All Products**

This comprises the connection of the various types of circuits contained in the unit to different equipment being monitored. For example:

OMCU Circuit	Traffic Controller Monitoring Point
Analogue Circuits	Current sensors for monitoring Aspect Current and Voltage Monitoring Transformer for monitoring Lamp Supply voltage.
Low Voltage Circuit	To monitor Phase Greens
Extra Low Voltage Circuit	Digital Signal Monitors e.g. Detector Inputs, Controller Micro Switches, etc.

This is not an exhaustive list and other applications exist. The following sub-sections detail the methods for the interfaces mentioned...

The connection methods to be used when monitoring Controller Lamp Voltages are as described in sections 5.6.1 and 5.6.2 below:

5.6.1 Serial Linked

13	Connect serial linked Gemini	5.6.1

The basic Lamp Monitoring configuration requires a TR0141 cable connection back to the Controller (see Figure 2 on page 20). The cableform (667/1/26579/000) is installed between PL4 on the Outstation and the handset connector on the Controller CPU.

Note that the cableform 667/1/26586/800 (High Voltage Serial Link) is not required as the high voltage monitoring is wired as defined below.

Connect the wires from PL1 on the Outstation PSU as follows:

Pin No.	Wire Colour		MDU on ST800 controller	Phase Driver PCB on ST700 controller
PL1.6	RED	Lamp Supply	PL2.10	SK2 Pin 6
PL1.8	BLACK	Neutral	PL2.224 (or Neutral connection on back panel)	SK1 Pin 3
Leave coiled	YELLOW		Not required	Not required

Note: for Lamp Supply connection on an ELV controller, see Note 4 of section 5.2.4.

5.6.2 Freestanding

For Lamp Monitoring purposes, the cable required for a freestanding Outstation (used with any controller other than ST800/700) is the High Voltage Detector cableform 667/1/26586/000. Refer to Figure 3 on page 20 for details.

Note: For Lamp Monitoring purposes, the Outstation in freestanding mode is equivalent to the older freestanding OMU.

For the connections required, see sections 5.6.2.1 to 5.6.2.4 and Figure 19. **Do not connect** the Red, Yellow or Black leads from PL1 on the PSU.

5.6.2.1 Current Sensors and Digital Outputs Connections

Applicable To: **OMCU Only**

14	Connect lamp current sensors	5.6.2.1

Warning The current sensors must not be fitted to mains' leads carrying current unless they are plugged into their respective LMU I/O boards to terminate them; otherwise they may produce a high voltage.

Each controller signal output, which is to be monitored, requires one current sensor as described on the RMS Instation computer printout. Examples of output types to be monitored are indicated in the following list. They all require one current sensor unless otherwise stated:

(a) Each 3-aspect vehicle phase
(b) Each 2-aspect pedestrian phase
(c) A 3-aspect pelican vehicle phase
(d) A 2-aspect pelican pedestrian
(e) Each group of wait lamps associated with the same pedestrian phase
(f) Each green arrow (or filter) phase
(g) Each switched sign phase
(h) If regulatory signs are to be monitored then they need to be grouped together
(i) Each “flashing amber signal group” phase requires one or two current sensors, depending on monitoring requirements (this phase type is applicable to export signal sequences only)

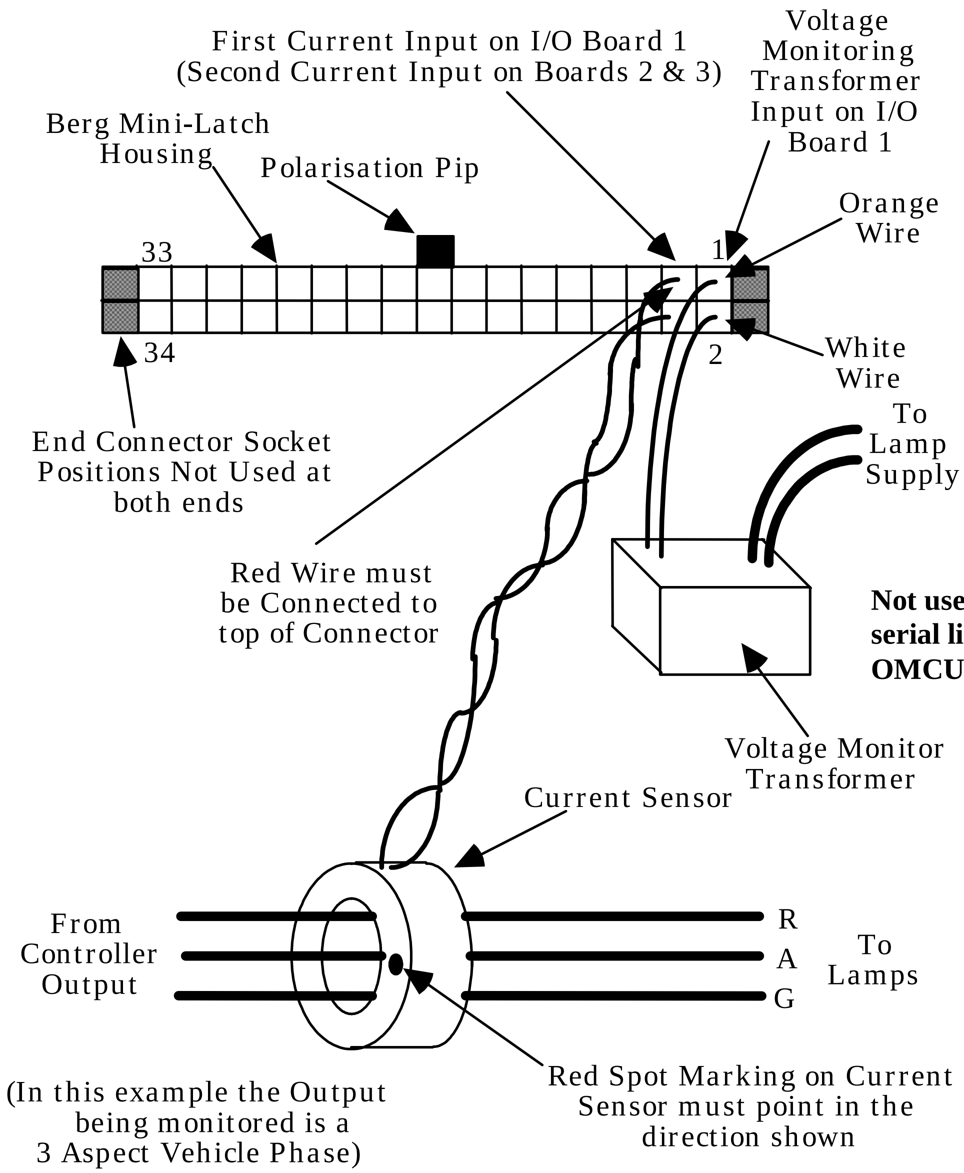
Each current sensor can monitor currents up to 4.25A RMS.

If the nominal load current (not including the red/ambers) of a particular controller output exceeds approximately 4.0A RMS, then that output should be split and treated as two separate outputs.

The maximum regulatory sign load is restricted to 7 signs (21 tubes) per input (choke/ballast types only allowed).

The current sensors measure the current flowing in the wires that are passing through their core. To maintain the correct relationship between the current flowing in the conductor and the output from the sensor, the sensors must be connected the correct way round (see following diagram).

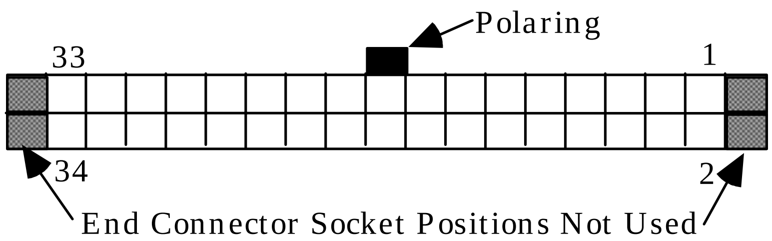
Figure 19 – Current Sensor Connection



For more details see 667/GA/32600/000 sheet 2 in Appendix B. The current sensor should be mechanically secured by passing a tywrap or equivalent through the sensor hole and around a suitable fixing point.

Caution ***The sensors may produce a high voltage when current is passed through the core if they are not terminated into an I/O Board.***

The sensors are terminated with Berg Mini PV terminals and are clipped into a Berg mini latch housing, to provide a complete sensor assembly...



Connector Viewed from the BACK

The mini latch housing is the Analogue connector 508/4/26138/002, which plugs into PL1 on the I/O Board. The PL1 circuit allocation is as follows:

Also see 667/GA/32600/000 sheet 2 in Appendix B

Pin No.	Description
PL1 pin 1 PL1 pin 2 *[2]*	Analogue Input 1 [1]
PL1 pin 3 PL1 pin 4 *[2]*	Analogue Input 2
PL1 pin 5 PL1 pin 6 *[2]*	Analogue Input 3
PL1 pin 7 PL1 pin 8 *[2]*	Analogue Input 4
PL1 pin 9 PL1 pin 10 *[2]*	Analogue Input 5
PL1 pin 11 PL1 pin 12 *[2]*	Analogue Input 6
PL1 pin 13 PL1 pin 14 *[2]*	Analogue Input 7
PL1 pin 15 PL1 pin 16 *[2]*	Analogue Input 8
PL1 pin 17 PL1 pin 18 *[2]*	Analogue Input 9
PL1 pin 19 PL1 pin 20 *[2]*	Analogue Input 10

Pin No.	Description
PL1 pin 21 PL1 pin 22	Isolated Relay Output 1
PL1 pin 23 PL1 pin 24	Isolated Relay Output 2
PL1 pin 25 PL1 pin 26	Isolated Relay Output 3
PL1 pin 27 PL1 pin 28	Isolated Relay Output 4 *[3]*

Pin No.	Description
PL1 pin 29	+12V modem supply *[4]*
PL1 pin 30	+8V modem supply *[4]*
PL1 pin 31 PL1 pin 32	Not used
PL1 pin 33	+5V modem supply *[4]*
PL1 pin 34	0V common return *[4]*

Notes:
[1] ‘Analogue Input 1’ on I/O Board 1 is reserved for the voltage monitor transformer.
[2] Pins 2, 4, 6, 8, 10, 12, 14, 16, 18 and 20 are commoned on the LMU I/O Board.
[3] Reserved for controlling the modem power on the first LMU I/O board.
[4] See section 5.2.2 on page 71 for details on the modem power connections.

5.6.2.2 Lamp Supply Sensor Connection

Applicable To: **OMCU Only**

15	Connect lamp supply sensor	5.6.2.2

The lamp supply sensor (Voltage Monitoring Transformer) should be connected to the cabinet lamp supply as follows and the sensor should be mechanically secured to a suitable location within the controller. See the previous page for details on PL1.

Red	Lamp Supply
Black	Lamp Supply Common (Neutral)
Orange	Pin 1 of Analogue Connector PL1 of first LMU I/O Board
White	Pin 2 of Analogue Connector PL1 of first LMU I/O Board

5.6.2.3 Green Voltage Detector Connections

Applicable To: **OMCU and Car Park**

16	Connect mains voltage / 3RD Party ELV AC detector cableforms	5.6.2.3

With the exception of the regulatory signs, each controller output monitored requires a connection to the green lamp drive voltage for that output. For single aspect outputs, the drives to those aspects are used in place of the green signal.

Connection to the unit is via cableform 667/1/26586/000 and each state connection must be terminated, as indicated in Figure 20, and as detailed in the Instation Computer Printout.

Mains Voltages:

Pin No.	Wire Colour	Description	All Controllers (except ST800/700)
PL2 PIN 1	WHITE	Input 1	Controller Mains
PL2 PIN 2	GREY	Input 2	Green Drive A
PL2 pin 3	VIOLET	Input 3	Green Drive B
PL2 pin 4	BLUE	Input 4	Etc…
PL2 pin 5	YELLOW	Input 5	See note below
PL2 pin 6	ORANGE	Input 6	
PL2 pin 7	RED	Input 7	
PL2 pin 8	BROWN	Input 8	
PL2 pin 9	GREEN	Input 9	
PL2 pin 10	PINK	Input 10	
PL2 pin 11	RED	Leave open circuit ZXO derived from PSU module.	
PL2 pin 12	BLACK	Common NEUTRAL (for above inputs).	
PL2 pin 13		Leave open circuit ZXO derived from PSU module.	
PL2 pin 14	BLACK	Leave open circuit ZXO derived from PSU module.	

Note: This connector is also used by the OMCU to monitor the state of other mains level signals, such as the controller's mains supply (after its switches and fuses) for example, which is normally connected to the first mains state input on the first LMU I/O board. Does not apply to the 3RD Party ELV AC LMU I/O Board. Please see below.

3RD Party ELV AC Voltages:

Pin No.	Wire Colour	Description	3RD Party ELV Controllers
PL2 PIN 1	WHITE	Input 1	Unused *
PL2 PIN 2	GREY	Input 2	Green Drive A
PL2 pin 3	VIOLET	Input 3	Green Drive B
PL2 pin 4	BLUE	Input 4	Green Drive C
PL2 pin 5	YELLOW	Input 5	Etc…
PL2 pin 6	ORANGE	Input 6	
PL2 pin 7	RED	Input 7	
PL2 pin 8	BROWN	Input 8	
PL2 pin 9	GREEN	Input 9	
PL2 pin 10	PINK	Input 10	
PL2 pin 11	RED	Leave open circuit ZXO derived from PSU module.	
PL2 pin 12	BLACK	Common NEUTRAL (for above inputs). **	
PL2 pin 13		Leave open circuit ZXO derived from PSU module.	
PL2 pin 14	BLACK	Leave open circuit ZXO derived from PSU module.	

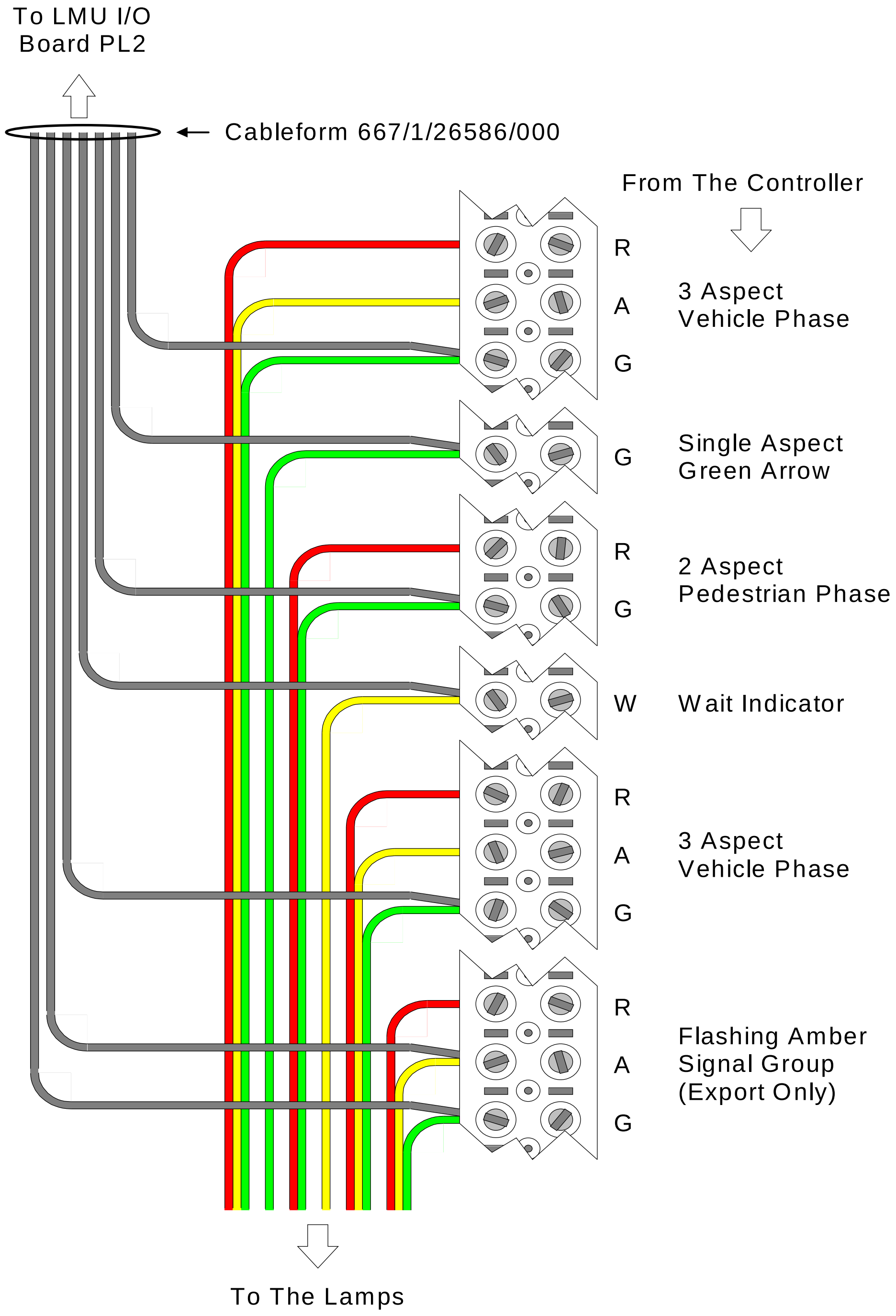
Notes:

* The 3RD Party ELV AC LMU I/O Board does not accept mains voltages of any kind. Monitoring of controller mains can be achieved by using High Voltage Input 1 on the PSU connector as described in section 5.2.4†.

** NEUTRAL here refers to 3RD Party ELV Neutral and this cable is to be connected to the same ELV Neutral block used by the signals. **There must be NO connection between mains and ELV neutrals anywhere within the controller.**

† High Voltage input 2 on the PSU connector (section 5.2.4) **must not** be connected when using the 3RD Party ELV AC LMU I/O Board.

Figure 20 – Typical Green State Connections



5.6.2.4 Digital Monitor Connections (LMU I/O Board Only)

Applicable To: **OMCU, VC and Car Park**

17	Connect digital monitors cables	5.6.2.4

Digital Monitor points within the controller should be connected using the cableform 667/1/26585/000 as detailed on the Instation Computer Printout.

The connectors for these cableforms are on the underside of the board; i.e. on the opposite side to the mains' states connector. The silk-screening for their identifications (PL3 and PL4) and arrows are located on the topside of the board, near the edge.

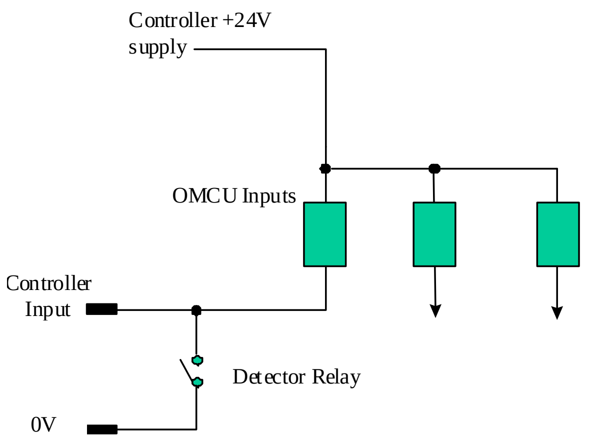
These Inputs are not polarity conscious, but are voltage conscious. This means they are connected one way for 24V logic working and the other way for 5V logic working. Hence the method of selecting 24V or 5V working is by reversing the inputs to the I/O Board.

For installations with 24V working the odd numbered pin on each input should be connected to the 24V controller supply, and the even numbered pin connected to the controller input / detector output. For Installations with 5V working the opposite is true, with the even numbered pin being connected to the controller 5V supply.

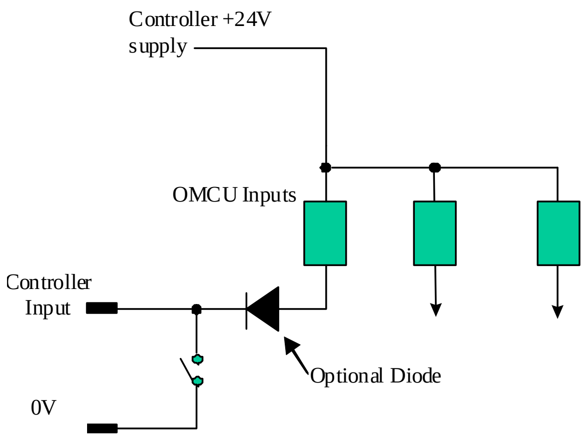
The ribbon cable should not be connected to 0V in either situation as this will invert the input and may cause unstable operation.

For example, referring to the first extra low voltage input, then for 24V working, connect the brown lead from PL4 pin 1 to the +ve signal (24V Supply) and the red lead from PL4 pin 2 to the –ve signal (controller input / detector output).

For 5V working, connect the red lead from PL4 pin 2 to the +ve signal and the brown lead from PL4 pin 1 to the –ve signal.



If the correct method is used for the inputs voltage level, but occasional false detections or drop outs are being experienced, a diode (1N4007) can be installed between the digital input on the LMU I/O board and the controller input. This prevents any noise on the controller input triggering the 'reverse circuits' (For example, when monitoring 24V signals, if the signal voltage goes above the common voltage by between 1V to 3V the 5V monitor circuit will be triggered.)



There are two Extra Low Voltage cableforms to each I/O Board. They are made from ribbon cable and therefore need to be spilt as required to suit the routing at the installation. It is therefore recommended that care be taken during the configuration process at the Instation, to ensure that detectors on a terminal block should not be split over different ports.

Each cableform can cater for up to 8 inputs, and have the same colour coding, as defined below. The input ports are allocated to LMU I/O Boards in the following order. If Bus / MOVA I/O boards are also fitted, then the OMCU application can also read the inputs on those boards, see section 5.6.3 overleaf.

1st LMU I/O Board	**Ports 0 (PL4) & 1 (PL3)**	**Inputs 1 to 16**
2nd LMU I/O Board	**Ports 2 (PL4) & 3 (PL3)**	**Inputs 17 to 32**
3rd LMU I/O Board	**Ports 4 (PL4) & 5 (PL3)**	**Inputs 33 to 48**

The connectors for these cableforms are on the underside of the board; i.e. on the opposite side to the mains' states connector. The silk-screening for their identifications (PL3 and PL4) and arrows are located on the topside of the board, near the edge.

		PORT 0 – PL4			PORT 1 – PL3		
5V	24V	Connector and Pin	Ribbon Wire Colour	Input No.	Connector and Pin	Ribbon Wire Colour	Input No.
-	+	PL4 PIN 1	BROWN	1	PL3 pin 1	BROWN	9
+	-	PL4 pin 2	RED		PL3 pin 2	RED	
-	+	PL4 pin 3	ORANGE	2	PL3 pin 3	ORANGE	10
+	-	PL4 pin 4	YELLOW		PL3 pin 4	YELLOW	
-	+	PL4 pin 5	GREEN	3	PL3 pin 5	GREEN	11
+	-	PL4 pin 6	BLUE		PL3 pin 6	BLUE	
-	+	PL4 pin 7	VIOLET	4	PL3 pin 7	VIOLET	12
+	-	PL4 pin 8	SLATE		PL3 pin 8	SLATE	
-	+	PL4 pin 9	WHITE	5	PL3 pin 9	WHITE	13
+	-	PL4 pin 10	BLACK		PL3 pin 10	BLACK	
-	+	PL4 pin 11	2nd BROWN	6	PL3 pin 11	2nd BROWN	14
+	-	PL4 pin 12	2nd RED		PL3 pin 12	2nd RED	
-	+	PL4 pin 13	2nd ORANGE	7	PL3 pin 13	2nd ORANGE	15
+	-	PL4 pin 14	2nd YELLOW		PL3 pin 14	2nd YELLOW	
-	+	PL4 pin 15	2nd GREEN	8	PL3 pin 15	2nd GREEN	16
+	-	PL4 pin 16	2nd BLUE		PL3 pin 16	2nd BLUE	

Important

The supplied crimp on the end of the cable should be inserted into the appropriate terminal block and spare wire should be tied back. The cable should not be cut in order to shorten it.

Any of these ports, up to a total of four, may be used for N+1 flow counting. If this is the case, the uses of the first five inputs on the port have the following fixed allocation:

Input 0 - "A" detector (by convention furthest from the Kerb)
Input 1 - "B" detector
Input 2 - "C" detector
Input 3 - "D" detector
Input 4 - "U" detector (U/D loop for "A")
Input 5 - Available for use as a normal OMCU digital input
Input 6 - Available for use as a normal OMCU digital input
Input 7 - Available for use as a normal OMCU digital input

Once the N+1 flow-counting function has been allocated to a port, the use of the five input lines is fixed as indicated. If some of these five inputs are not required (e.g. for a 2 lane approach, "D" would not be required) they must be left unconnected. Where U/D operation is not required, the "U" input must be left unconnected.

THEY MUST NOT BE USED FOR ORDINARY DETECTOR OR DIGITAL INPUTS.

However, inputs 5 to 7 on a 'count' port can be used as normal OMCU digital inputs.

5.6.3 CPU and BUS / MOVA (Digital) I/O

Applicable To: **Bus, VC, UTMC OTU and UTMC VMS**

18	Connect CPU & Bus Processor digital I/O	5.6.3

The Processor and Bus / MOVA (Digital) I/O Boards have different digital input and output connectors than the LMU I/O board described in section 5.6.2.4. If a Bus / MOVA (Digital) I/O board is fitted to an Outstation to perform Bus Processor, Vehicle Classification, UTMC OTU or UTMC VMS functions, then this section details the digital I/O connections on that I/O board. However, if the I/O board is used for MOVA, see sections 9.2 and 9.3 which start on page 142.

The tables on the following pages show the functions associated with the digital I/O connectors on the CPU and Bus / MOVA (Digital) I/O boards. It shows the Buffered Input's and Isolated Output's numbering allocation for the first and second I/O boards, although the actual I/O line numbers used by the unit will depend on the position of the boards in the stack.

The cableform used for the CPU is 667/1/30607/000.

There are different cableforms that may be connected to PL1 and PL2 connectors of the BUS / MOVA (Digital) I/O board. These are to cover differing connection requirements. For the relevant cableforms and their wire colours and terminal block allocations see drawing 667/GA/30607/000, 667/GA/26585/003, 667/GA/26585/004 and 667/GA/26585/010 at the back of this handbook.

Processor Board Connector PL5 Connector Allocation

Pin	Processor PL5
1	n/open O/P 1
2	common 1
3	n/closed O/P 1
4	n/open O/P 2
5	common 2
6	n/closed O/P 2
7	I/P Common Ret
8	Buffered I/P 1
9	Buffered I/P 2
10	Buffered I/P 3
11	Buffered I/P 4
12	Buffered I/P 5
13	Buffered I/P 6
14	Buffered I/P 7
15	Buffered I/P 8

Note

Handset commands and displays use numbering of inputs and outputs starting from 0 rather than 1.

Bus / MOVA (Digital) I/O Board Connector PL1 and PL2 Connector Allocation

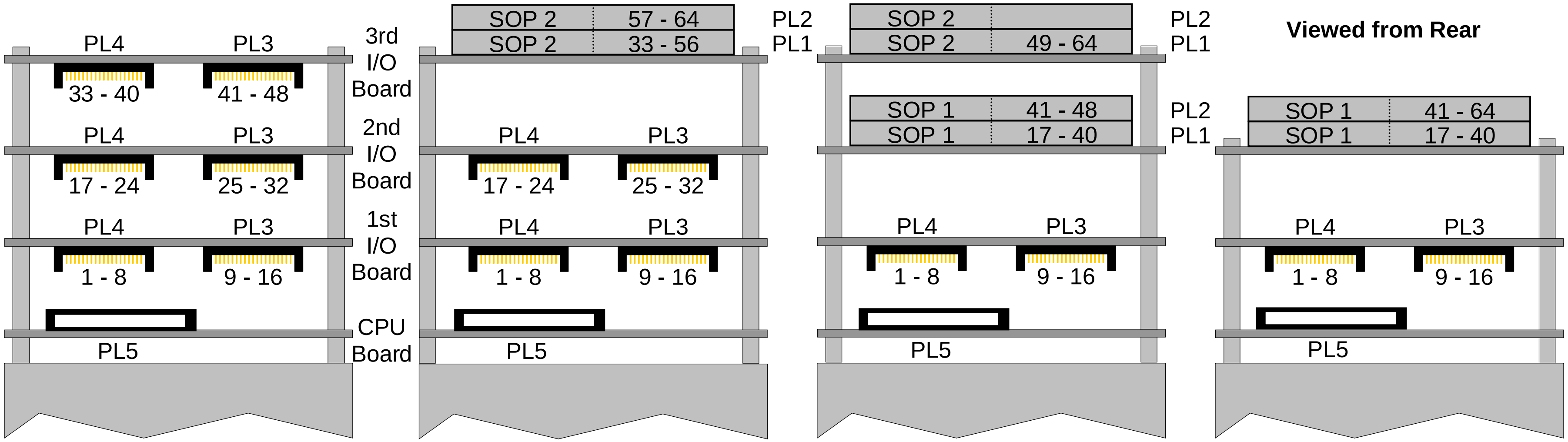
Pin	Board 1 PL1	Board 1 PL2
1	Buffered I/P 1	Buffered I/P 25
2	Buffered I/P 2	Buffered I/P 26
3	Buffered I/P 3	Buffered I/P 27
4	Buffered I/P 4	Buffered I/P 28
5	Buffered I/P 5	Buffered I/P 29
6	Buffered I/P 6	Buffered I/P 30
7	Buffered I/P 7	Buffered I/P 31
8	Buffered I/P 8	Buffered I/P 32
9	Buffered I/P 9	Buffered I/P 33
10	Buffered I/P 10	Buffered I/P 34
11	Buffered I/P 11	Buffered I/P 35
12	Buffered I/P 12	Buffered I/P 36
13	Buffered I/P 13	Buffered I/P 37
14	Buffered I/P 14	Buffered I/P 38
15	Buffered I/P 15	Buffered I/P 39
16	Buffered I/P 16	Buffered I/P 40
17	Buffered I/P 17	Buffered I/P 41
18	Buffered I/P 18	Buffered I/P 42
19	Buffered I/P 19	Buffered I/P 43
20	Buffered I/P 20	Buffered I/P 44
21	Buffered I/P 21	Do Not Use
22	Buffered I/P 22	Do Not Use
23	Buffered I/P 23	Do Not Use
24	Buffered I/P 24	Do Not Use
25	I/P Common Ret	I/P Common Ret
26	I/P Common Ret	I/P Common Ret
27	n/open O/P 1	n/open O/P 9
28	n/closed O/P 1	n/closed O/P 9
29	common 1	common 9
30	n/open O/P 2	n/open O/P 10
31	n/closed O/P 2	n/closed O/P 10
32	common 2	common 10
33	n/open O/P 3	n/open O/P 11
34	n/closed O/P 3	n/closed O/P 11
35	common 3	common 11
36	n/open O/P 4	n/open O/P 12
37	n/closed O/P 4	n/closed O/P 12
38	common 4	common 12
39	n/open O/P 5	n/open O/P 13
40	n/closed O/P 5	n/closed O/P 13
41	common 5	common 13
42	n/open O/P 6	n/open O/P 14
43	n/closed O/P 6	n/closed O/P 14
44	common 6	common 14
45	n/open O/P 7	n/open O/P 15
46	n/closed O/P 7	n/closed O/P 15
47	common 7	common 15
48	n/open O/P 8	n/open O/P 16
49	n/closed O/P 8	n/closed O/P 16
50	common 8	common 16

Pin	Board 2 PL1	Board 2 PL2
1	Buffered I/P 49	Buffered I/P 73
2	Buffered I/P 50	Buffered I/P 74
3	Buffered I/P 51	Buffered I/P 75
4	Buffered I/P 52	Buffered I/P 76
5	Buffered I/P 53	Buffered I/P 77
6	Buffered I/P 54	Buffered I/P 78
7	Buffered I/P 55	Buffered I/P 79
8	Buffered I/P 56	Buffered I/P 80
9	Buffered I/P 57	Buffered I/P 81
10	Buffered I/P 58	Buffered I/P 82
11	Buffered I/P 59	Buffered I/P 83
12	Buffered I/P 60	Buffered I/P 84
13	Buffered I/P 61	Buffered I/P 85
14	Buffered I/P 62	Buffered I/P 86
15	Buffered I/P 63	Buffered I/P 87
16	Buffered I/P 64	Buffered I/P 88
17	Buffered I/P 65	Buffered I/P 89
18	Buffered I/P 66	Buffered I/P 90
19	Buffered I/P 67	Buffered I/P 91
20	Buffered I/P 68	Buffered I/P 92
21	Buffered I/P 69	Buffered I/P 93
22	Buffered I/P 70	Buffered I/P 94
23	Buffered I/P 71	Buffered I/P 95
24	Buffered I/P 72	Buffered I/P 96
25	I/P Common Ret	I/P Common Ret
26	I/P Common Ret	I/P Common Ret
27	n/open O/P 17	n/open O/P 25
28	n/closed O/P 17	n/closed O/P 25
29	common 17	common 25
30	n/open O/P 18	n/open O/P 26
31	n/closed O/P 18	n/closed O/P 26
32	common 18	common 26
33	n/open O/P 19	n/open O/P 27
34	n/closed O/P 19	n/closed O/P 27
35	common 19	common 27
36	n/open O/P 20	n/open O/P 28
37	n/closed O/P 20	n/closed O/P 28
38	common 20	common 28
39	n/open O/P 21	n/open O/P 29
40	n/closed O/P 21	n/closed O/P 29
41	common 21	common 29
42	n/open O/P 22	n/open O/P 29
43	n/closed O/P 22	n/closed O/P 30
44	common 22	common 30
45	n/open O/P 23	n/open O/P 31
46	n/closed O/P 23	n/closed O/P 31
47	common 23	common 31
48	n/open O/P 24	n/open O/P 32
49	n/closed O/P 24	n/closed O/P 32
50	common 24	common 32

Notes:

1. Handset commands and displays use numbering of inputs and outputs starting from 0 rather than 1
2. See figure 9.2.4.1 on page 145 for associated cable form wire colours.

The OMCU application can also read the digital inputs on any Bus / MOVA I/O boards that are fitted. The following diagrams and tables summarise where the OMCU's 64 detector inputs are located when various combinations of CPU and I/O boards are fitted. For example, in addition to the 32 inputs on two LMU I/O boards, the OMCU can also monitor all 32 MOVA detectors on a MOVA I/O board (PL1 1 to 24 and PL2 1 to 8):



3 LMU I/O Boards (Or Less), But No Bus/MOVA I/O Boards

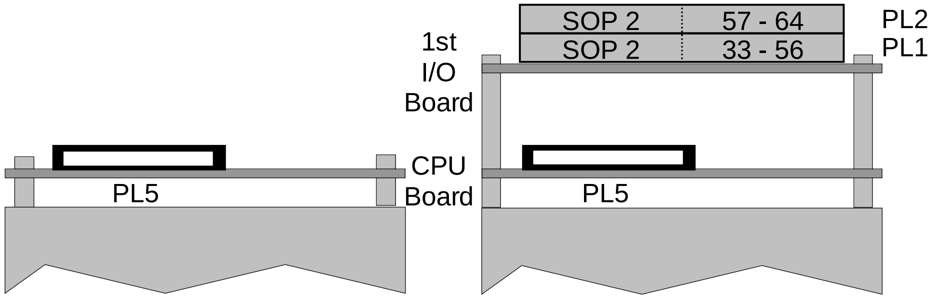
2 LMU I/O Boards plus 1 Bus/MOVA I/O Board

1 LMU I/O Board plus 2 Bus/MOVA I/O Boards

1 LMU I/O Board plus 1 Bus/MOVA I/O Board

OMCU Detectors	Board		Connector and Pins		Board		Connector and Pins		Board		Connector and Pins		Board		Connector and Pins		OMCU Detectors
	No.	Type			No.	Type			No.	Type			No.	Type			
1 – 8	1	LMU	PL4	1 – 16	1	LMU	PL4	1 – 16	1	LMU	PL4	1 – 16	1	LMU	PL4	1 – 16	1 – 8
9 – 16	1	LMU	PL3	1 – 16	1	LMU	PL3	1 – 16	1	LMU	PL3	1 – 16	1	LMU	PL3	1 – 16	9 – 16
17 – 24	2	LMU	PL4	1 – 16	2	LMU	PL4	1 – 16	2	B / M	PL1	1 – 8	2	B / M	PL1	1 – 8	17 – 24
25 – 32	2	LMU	PL3	1 – 16	2	LMU	PL3	1 – 16	2	B / M	PL1	9 – 16	2	B / M	PL1	9 – 16	25 – 32
33 – 40	3	LMU	PL4	1 – 16	3	B / M	PL1	1 – 8	2	B / M	PL1	17 – 24	2	B / M	PL1	17 – 24	33 – 40
41 – 48	3	LMU	PL3	1 – 16	3	B / M	PL1	9 – 16	2	B / M	PL2	1 – 8	2	B / M	PL2	1 – 8	41 – 48
49 – 56		CPU	PL5	7 – 15	3	B / M	PL1	17 – 24	3	B / M	PL1	1 – 8	2	B / M	PL2	9 – 16	49 – 56
57 – 64					3	B / M	PL2	1 – 8	3	B / M	PL1	9 – 16	2	B / M	PL2	17 – 24	57 – 64

Viewed from Rear



CPU card only

CPU card + 1 Bus/MOVA I/O Board

OMCU Detectors	Board No.	Board Type	Connector and Pins		Board No.	Board Type	Connector and Pins		OMCU Detectors
1 – 8					1	B / M	PL1	1 – 8	1 – 8
9 – 16					1	B / M	PL1	9 – 16	9 – 16
17 – 24					1	B / M	PL1	17 – 24	17 – 24
25 – 32					1	B / M	PL2	1 – 8	25 – 32
33 – 40					1	B / M	PL2	9 – 16	33 – 40
41 – 48					1	B / M	PL2	17 – 24	41 – 48
49 – 56		CPU	PL5	7 – 15		CPU	PL5	7 – 15	49 – 56
57 – 64									57 – 64

The table on the following page identifies the board, connector, pin and wire colour for each input, of the first four cases shown above.

OMCU Detectors On Bus / MOVA I/O Boards

3 LMU I/O Boards (no Bus / MOVA I/O Boards)

Board	Connector			OMCU Inputs
I/O Board #1 – LMU I/O Board	PL4 Ribbon 16W	1 BRO	2 RED	1
		3 ORA	4 YEL	2
		5 GRN	6 BLU	3
		7 VIO	8 SLA	4
		9 WHI	10 BLA	5
		11 BRO	12 RED	6
		13 ORA	14 YEL	7
		15 GRN	16 BLU	8
	PL3 Ribbon 16W	1 BRO	2 RED	9
		3 ORA	4 YEL	10
		5 GRN	6 BLU	11
		7 VIO	8 SLA	12
		9 WHI	10 BLA	13
		11 BRO	12 RED	14
		13 ORA	14 YEL	15
		15 GRN	16 BLU	16
I/O Board #2 – LMU I/O Board	PL4 Ribbon 16W	1 BRO	2 RED	17
		3 ORA	4 YEL	18
		5 GRN	6 BLU	19
		7 VIO	8 SLA	20
		9 WHI	10 BLA	21
		11 BRO	12 RED	22
		13 ORA	14 YEL	23
		15 GRN	16 BLU	24
	PL3 Ribbon 16W	1 BRO	2 RED	25
		3 ORA	4 YEL	26
		5 GRN	6 BLU	27
		7 VIO	8 SLA	28
		9 WHI	10 BLA	29
		11 BRO	12 RED	30
		13 ORA	14 YEL	31
		15 GRN	16 BLU	32
I/O Board #3 – LMU I/O Board	PL4 Ribbon 16W	1 BRO	2 RED	33
		3 ORA	4 YEL	34
		5 GRN	6 BLU	35
		7 VIO	8 SLA	36
		9 WHI	10 BLA	37
		11 BRO	12 RED	38
		13 ORA	14 YEL	39
		15 GRN	16 BLU	40
	PL3 Ribbon 16W	1 BRO	2 RED	41
		3 ORA	4 YEL	42
		5 GRN	6 BLU	43
		7 VIO	8 SLA	44
		9 WHI	10 BLA	45
		11 BRO	12 RED	46
		13 ORA	14 YEL	47
		15 GRN	16 BLU	48
CPU Board Inputs	PL5 Phoenix 15 Way	8 BLU		49
		9 YEL		50
		10 BRO		51
		11 VIO		52
		12 ORA		53
		13 SLA		54
		14 PIN		55
		15 BLU	GRN	56
		7 WHI	COMMN	

2 LMU I/O Boards plus 1 Bus / MOVA I/O Board

Board	Connector			OMCU Inputs
I/O Board #1 – LMU I/O Board	PL4 Ribbon 16W	1 BRO	2 RED	1
		3 ORA	4 YEL	2
		5 GRN	6 BLU	3
		7 VIO	8 SLA	4
		9 WHI	10 BLA	5
		11 BRO	12 RED	6
		13 ORA	14 YEL	7
		15 GRN	16 BLU	8
	PL3 Ribbon 16W	1 BRO	2 RED	9
		3 ORA	4 YEL	10
		5 GRN	6 BLU	11
		7 VIO	8 SLA	12
		9 WHI	10 BLA	13
		11 BRO	12 RED	14
		13 ORA	14 YEL	15
		15 GRN	16 BLU	16
I/O Board #2 – LMU I/O Board	PL4 Ribbon 16W	1 BRO	2 RED	17
		3 ORA	4 YEL	18
		5 GRN	6 BLU	19
		7 VIO	8 SLA	20
		9 WHI	10 BLA	21
		11 BRO	12 RED	22
		13 ORA	14 YEL	23
		15 GRN	16 BLU	24
	PL3 Ribbon 16W	1 BRO	2 RED	25
		3 ORA	4 YEL	26
		5 GRN	6 BLU	27
		7 VIO	8 SLA	28
		9 WHI	10 BLA	29
		11 BRO	12 RED	30
		13 ORA	14 YEL	31
		15 GRN	16 BLU	32
I/O Board #3 – BUS/MOVA I/O Board	PL1 Berg 50W	1 BLU		33
		2 YEL		34
		3 BRO		35
		4 VIO		36
		5 ORA		37
		6 SLA		38
		7 PIN		39
		8 RED BLU		40
		9 RED GRN		41
		10 RED WHI		42
		11 RED BRO		43
		12 RED ORA		44
		13 RED SLA		45
		14 BLU GRN		46
		15 BLU WHI		47
		16 BLU BRO		48
		17 BLU ORA		49
		18 BLU SLA		50
		19 GRN ORA		51
		20 GRN BRO		52
		21 GRN SLA		53
		22 BRO SLA		54
		23 ORA BRO		55
		24 ORA SLA		56
	PL2 Berg 50W	1 BLU		57
		2 YEL		58
		3 BRO		59
		4 VIO		60
		5 ORA		61
		6 SLA		62
		7 PIN		63
		8 RED BLU		64

1 LMU I/O Board plus 2 Bus / MOVA I/O Boards

Board	Connector			OMCU Inputs
I/O Board #1 – LMU I/O Board	PL4 Ribbon 16W	1 BRO	2 RED	1
		3 ORA	4 YEL	2
		5 GRN	6 BLU	3
		7 VIO	8 SLA	4
		9 WHI	10 BLA	5
		11 BRO	12 RED	6
		13 ORA	14 YEL	7
		15 GRN	16 BLU	8
	PL3 Ribbon 16W	1 BRO	2 RED	9
		3 ORA	4 YEL	10
		5 GRN	6 BLU	11
		7 VIO	8 SLA	12
		9 WHI	10 BLA	13
		11 BRO	12 RED	14
		13 ORA	14 YEL	15
		15 GRN	16 BLU	16
I/O Board #2 – BUS/MOVA I/O Board	PL1 Berg 50W	1 BLU		17
		2 YEL		18
		3 BRO		19
		4 VIO		20
		5 ORA		21
		6 SLA		22
		7 PIN		23
		8 RED BLU		24
		9 RED GRN		25
		10 RED WHI		26
		11 RED BRO		27
		12 RED ORA		28
		13 RED SLA		29
		14 BLU GRN		30
		15 BLU WHI		31
		16 BLU BRO		32
		17 BLU ORA		33
		18 BLU SLA		34
		19 GRN ORA		35
		20 GRN BRO		36
		21 GRN SLA		37
		22 BRO SLA		38
		23 ORA BRO		39
		24 ORA SLA		40
	PL2 Berg 50W	1 BLU		41
		2 YEL		42
		3 BRO		43
		4 VIO		44
		5 ORA		45
		6 SLA		46
		7 PIN		47
		8 RED BLU		48
I/O Board #3 – BUS/MOVA I/O Board	PL1 Berg 50W	1 BLU		49
		2 YEL		50
		3 BRO		51
		4 VIO		52
		5 ORA		53
		6 SLA		54
		7 PIN		55
		8 RED BLU		56
		9 RED GRN		57
		10 RED WHI		58
		11 RED BRO		59
		12 RED ORA		60
		13 RED SLA		61
		14 BLU GRN		62
		15 BLU WHI		63
		16 BLU BRO		64

1 LMU I/O Board plus 1 Bus / MOVA I/O Board

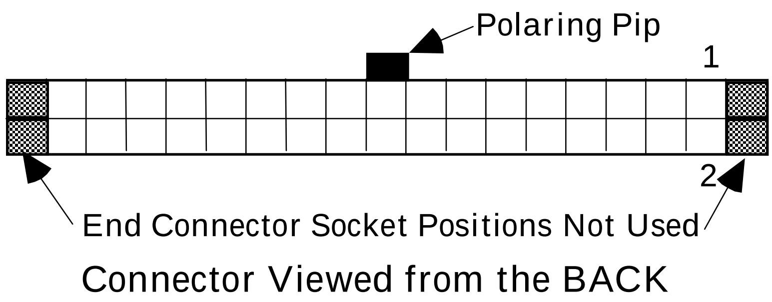
Board	Connector			OMCU Inputs
I/O Board #1 – LMU I/O Board	PL4 Ribbon 16W	1 BRO	2 RED	1
		3 ORA	4 YEL	2
		5 GRN	6 BLU	3
		7 VIO	8 SLA	4
		9 WHI	10 BLA	5
		11 BRO	12 RED	6
		13 ORA	14 YEL	7
		15 GRN	16 BLU	8
	PL3 Ribbon 16W	1 BRO	2 RED	9
		3 ORA	4 YEL	10
		5 GRN	6 BLU	11
		7 VIO	8 SLA	12
		9 WHI	10 BLA	13
		11 BRO	12 RED	14
		13 ORA	14 YEL	15
		15 GRN	16 BLU	16
I/O Board #2 – BUS/MOVA I/O Board	PL1 Berg 50W	1 BLU		17
		2 YEL		18
		3 BRO		19
		4 VIO		20
		5 ORA		21
		6 SLA		22
		7 PIN		23
		8 RED BLU		24
		9 RED GRN		25
		10 RED WHI		26
		11 RED BRO		27
		12 RED ORA		28
		13 RED SLA		29
		14 BLU GRN		30
		15 BLU WHI		31
		16 BLU BRO		32
		17 BLU ORA		33
		18 BLU SLA		34
		19 GRN ORA		35
		20 GRN BRO		36
		21 GRN SLA		37
		22 BRO SLA		38
		23 ORA BRO		39
		24 ORA SLA		40
	PL2 Berg 50W	1 BLU		41
		2 YEL		42
		3 BRO		43
		4 VIO		44
		5 ORA		45
		6 SLA		46
		7 PIN		47
		8 RED BLU		48
		9 RED GRN		49
		10 RED WHI		50
		11 RED BRO		51
		12 RED ORA		52
		13 RED SLA		53
		14 BLU GRN		54
		15 BLU WHI		55
		16 BLU BRO		56
		17 BLU ORA		57
		18 BLU SLA		58
		19 GRN ORA		59
		20 GRN BRO		60
		21 GRN SLA		61
		22 BRO SLA		62
		23 ORA BRO		63
		24 ORA SLA		64

5.6.4 BUS / MOVA Board RS485 Serial Ports

Applicable To: **Bus, VC and UTMC VMS**

19	Connect RS485 cables, e.g. for SIETAG	5.6.4

The following Table shows the RS485 connector pin assignments on each BUS/MOVA I/O board.



RS485 Connections (PL3)

PL3 Pin Number	Board 1 Pin Function	Board 2 Pin Function	Board 3 Pin Function
1	Serial port 0 A	Serial port 4 A	Serial port 8 A
2	Serial port 0 B	Serial port 4 B	Serial port 8 B
3 & 4	not used	not used	not used
5	Serial port 1 A	Serial port 5 A	Serial port 9 A
6	Serial port 1 B	Serial port 5 B	Serial port 9 B
7 & 8	not used	not used	not used
9	Serial port 2 A	Serial port 6 A	Serial port 10 A
10	Serial port 2 B	Serial port 6 B	Serial port 10 B
11 & 12	not used	not used	not used
13	Serial port 3 A	Serial port 7 A	Serial port 11 A
14	Serial port 3 B	Serial port 7 B	Serial port 11 B

Note that the RS485 serial port numbers are determined by the board address (set as described in section 5.2.1). For example, the second I/O board is always allocated RS485 serial port numbers 4 to 7, even if the first I/O board is a LMU I/O type.

For the relevant cableform, wire colours and terminal block allocations, see drawing 667/GA/26585/004 at the back of this handbook.

The SIETAG readers, TfL beacons and RTIG link are connected to the Bus Processor via these RS485 serial ports. An overview of these Bus Processor functions is given in section 4.2.5.

The wiring to a SIETAG reader backplane is as follows:

'A' connects to SIETAG backplane pin 21

'B' connects to SIETAG backplane pin 15

Ensure that the SIETAG backplane is fitted with a link connecting the through-hole immediately above silk screen number "14" to the through-hole above silk screen number "21".

The line termination resistors on the BUS/MOVA I/O board should be set to 120Ω as described in section 5.2.5.

The RS485 serial port configuration must match the external device settings to receive and transmit data.

SIETAG Reader : 9600baud, parity disabled, 1 stop bit and 8 data bits.
TfL Beacon : 2400 baud, parity disabled, 1 stop bit and 8 data bits.
RTIG Link : 9600 baud, parity disabled, 1 stop bit and 8 data bits.

The serial ports are configured by RMS or by the POC and POS handset commands in section 13.10. The SOP handset command can be used to check that the BUS/MOVA I/O boards are being correctly detected by the Outstation, see page 248.

The DBM command (see section 13.8.8) can be used to display received characters on the RS485 serial ports. For example, early versions of SIETAG reader output an "`LI`" text string repeatedly in the idle state. While a vehicle tag is being detected, the reader outputs the tag number in HEX, e.g. "`LM 123456789ABCDEF`"

5.6.5 MOVA Digital I/O

Applicable To: **MOVA**

20	Connect MOVA digital I/O cables (Unless using ST800/700 enhanced serial link)	9.2 & 9.3
21	Step deleted.	

The MOVA digital I/O connections are detailed in sections 9.2 and 9.3, which start on page 142.

5.6.6 Post Installation Checks

Applicable To: **All Applications**

22	Complete post installation check	5.6.6

(a) Routing of cables
Signals for the following groups may be bunched together but must not be grouped to other cables or other cabinet signals to reduce the occurrence of extraneous signals upsetting the monitoring unit.

Group 1 – Digital Monitoring Signals.
Group 2 – Analogue Monitoring Signals.

Group 3 – Green Volts Detect Signals.

(b) Earth Continuity
The EARTH CONTINUITY RESISTANCE must not exceed 0.5 Ω on exposed metal parts of the unit when measured with reference to the EARTHING TERMINATION POINT of the cabinet.

(c) Check On Integrity of Neutral Connections (OMCU Applications)
With the controller switched on and cycling and a multi-meter set to measure AC volts – measure the voltage between each green feed and neutral, when the green is off. The voltage should be less than 5V RMS to meet IEE Regulations BS7671, if it is not then the neutral connection between the controller and the signal head(s) being tested may be faulty. Inspect all neutral runs that appear faulty, to ensure they are not loose or corroded.

5.6.7 Cable Form Identification

Applicable To: **All Applications**

23	Identify all connectors/cable forms	5.6.7
24	Connect all connectors to the unit	–

The label sleeve attached to all Monitoring Cable Form Assemblies, with the specific purpose of identifying the I/O Board and connector to which the cable form assembly is connected, should be marked with a permanent marker pen to identify its connector ID and board location, as follows:

For example: ‘PL1/1’ = Plug 1 – Board 1
‘PL4/3’ = Plug 4 – Board 3

All the cables should be connected to the unit at this point.

5.6.8 TR0141 Cable Installation (Controller)

Applicable To: **OMCU and MOVA**

25	Connect 141 cable to controller handset port (req’d for MOVA if using ST800/700 link)	5.6.8

The Outstation communicates with a controller using ribbon cable 667/1/26579/XXX. The variant depends on the type of controller being monitored. Section 7.5 on page 121 lists the different variants of this cable.

Insert this cable into plug PL4 (SIL 18 way) on the processor board (see drawing 667/GA/32600/000 in Appendix B), and the other end (25 way ‘D’ Type), into the appropriate ‘Handset Socket’ of the controller.

Note: This cable is required if MOVA is to use the enhanced serial link to an ST800/700 even if the OMCU application is not required, see section 4.2.6 on page 44.

5.6.9 TR0141 Cable Installation (OTU)

Applicable To: **Bus Only**

26	Connect 141 cable to OTU handset port (req'd for BUS if using OTU link)	5.6.9

The Outstation communicates with an OTU using ribbon cable 667/1/26579/000.

Insert this cable into plug PL4 (SIL 18 way) on the processor board (see drawing 667/GA/32600/000 in Appendix B), and the other end (25 way 'D' Type), into the appropriate 'Handset Socket' of the OTU.

Note: This cable is required if the unit is to use the 141 serial link for routing SIETAG vehicle detections to an OTU.

5.6.10 Mains Supply Connection

Applicable To: **All Applications**

27	Connect the unit to mains outlet	5.6.10
28	Restore controller and unit mains supply	–
29	Switch on unit supply	–

IMPORTANT

The wires in the mains' lead are coloured as follows:

BROWN – LIVE

BLUE – NEUTRAL

GREEN / YELLOW – EARTH

Mains' power is supplied to the unit through 6A rated cables.

Normally the unit is powered from an auxiliary mains supply provided within the controller. In controllers without this facility or if this is not convenient, a suitable alternative mains supply must be provided, being careful not to compromise the safety of the controller. A suitable disconnect device must be provided for this supply. (Refer to Poole Engineering if in doubt).

Do not connect the mains supply input of the unit to the lamp supply of the controller, as this will cause the unit to operate incorrectly.

Mains fused: The recommended rating of this external fuse is up to 5A anti-surge.

5.6.11 Connect Unit Support Battery

Applicable To: **All Applications**

30	Connect unit support battery	5.6.11

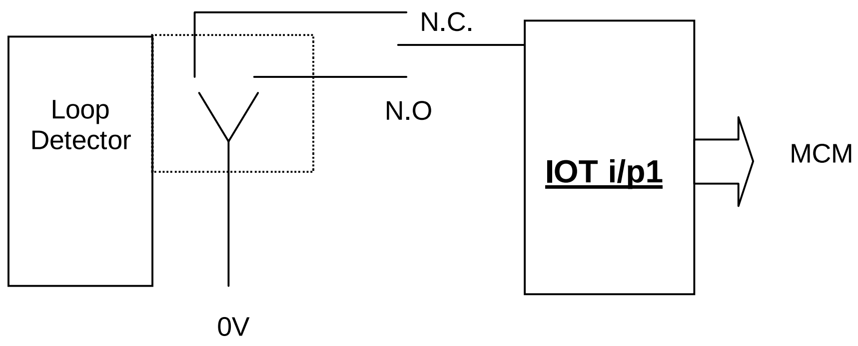
To connect the Unit Support Battery, the fuse (Part Number 518/4/90285/008 supplied separately), is inserted in the Battery Fuse Holder on the front panel. If the unit is to be left not powered after installation, this fuse should be removed and stored in a safe place, ready for insertion during commissioning.

5.6.12 Peek TRX Controller I/O connections

When installing the Outstation the detector monitoring inputs require access to the same 24VDC supply as is used to reference the detector inputs. At present this is not directly available.

To make the 24VDC supply available to the Siemens OMU the supply should be taken from the back of the TRX backplane. Soldering a wire to the connector pin "+24VDC" on the TRX backplane should make the connection. This wire is then connected to the wires from the OMU I/O connector, odd numbered pins (1, 3, etc). It is suggested that the first wire (brown) is used and all other odd numbered pins connected to this brown wire using a connector block. The detectors being monitored using this method should not exceed a current loading of 250mA under normal operating conditions.

Any detectors monitors that are used to monitor loop detectors wired using TRX detector backplanes can still access the relevant detector input using a screw terminal on the IOT PCB.



Therefore if a loop detector is configured as input 1 it can be monitored on the terminal block labelled i/p1 on the IOT PCB.

5.7 INSTALLATION OF THE UNIT IN ADDITIONAL OUTERCASE

When considering installation of a unit it is not always possible to mount it in the same cabinet as the associated controller. In these circumstances an additional Outercase will be needed which can be installed up to 8 metres from the controller.

5.8 INSTALLATION OF THE GEMINI^2 UPGRADE

Existing 3U OMUs can be enhanced by replacing the old CPU card with a GEMINI^2 version. All the wiring to the existing interface cards (LMU I/Os and BUS/MOVA I/Os) need not be disturbed.

The GEMINI^2 upgrade kit (667/1/32600/100) comprises:

- GEMINI^2 CPU card
- Power supply cable and connection
- Fixings

When carrying out the upgrade, please refer to 667/GA/32600/100 for details of what changes need to be made to the wiring of the existing unit.

The following steps should be taken to complete the change:

1. Remove power from the existing OMU.
2. Disconnect all the interface connections to the existing cards.
   NOTE: Take great care when doing this as high voltages will be present on some of the LMU I/O interfaces. If at all possible, you should switch the associated controller off during this upgrade.
3. Remove the whole of the OMU from the cabinet.
4. Remove the LMU and BUS/MOVA I/O cards (if fitted).
5. Remove the old processor card.
6. Cut off the old OMU power connector and strip back the wires to the PSU and attach the new connector provided in the upgrade kit (see 667/GA/32600/100).
7. Install the power supply cable onto the plug mounted on the back of the processor card.
8. Attach the processor card to the old PSU with the aid of the additional fixings provided in the upgrade kit, and connect the power cable.
9. Reinstall any LMU and BUS/MOVA cards.
10. Install the OMU back into the cabinet and reinstall any connectors removed during step 2. Ensure that the two “in line bullet connectors” for LMU I/O card No. 1 are reconnected.
11. Before reapplying the mains supply, inspect all connectors and associated cables (see additional information below).
12. Apply mains power and commission the unit as described in section 5.1.

5.8.1 Additional Information for Old Installations

It is not normally necessary to change any card address or general switch settings when upgrading a site.

However, the following information is provided which explains some of the old configuration settings:

5.8.1.1 50/60Hz Operation (LMU I/O Board only)

Applicable To: **OMCU and C/P**

If the Processor is added as an upgrade to an old style OMCU then the associated LMU I/O card will supply the timing reference signal. This will not normally require any change to the existing wiring. However the following information is provided should any changes be necessary.

To ensure the OMCU's lamp monitoring circuit operates correctly, set the timing to the required frequency using the fourth switch on the DIL 4-way switch S1 on the LMU I/O boards. See section 5.2.1 on page 70 for the position of this switch.

ON	For 60Hz operation.
OFF	For 50Hz operation.

5.8.1.2 120/230V Operation (LMU I/O Board only)

Applicable To: **OMCU only**

The following information is applicable if the Processor is added as an upgrade to an old style OMCU. This will not normally require any change to the existing wiring. However the following information is provided should any changes be necessary.

Note: The 3RD Party ELV AC LMU I/O Board does not accept mains voltages of any kind and cannot be used within this application.

WARNING

ZX0 WIRES FROM THE UNIT TO THE FIRST LMU I/O BOARD (NEAREST CPU)

The red and black wires that come from under the power supply cover through the ferrite are at mains potential when the unit is switched on.

For 230V operation, these wires connect to pins '14' and '11' on the expansion board connector PL2 (for full details of the connections see section 5.2.4 which starts on page 75).

The mains supply must be completely removed from the unit prior to:

- **Disconnecting these wires for any reason, e.g. replacing the unit.**
- **Any ZX0 circuit setting adjustments as defined in this section.**
- **Any operation that would leave these wires exposed.**

If, for any reason, these wires are left exposed and unattended (e.g. change out unit) they must be safely terminated with the unit unplugged from the mains' supply. The unit must not have mains applied to it until the wires are connected or safely terminated, for example by removing additional wires so that only the bullet connections, which provide protection against accidental contact with mains potentials, remain.

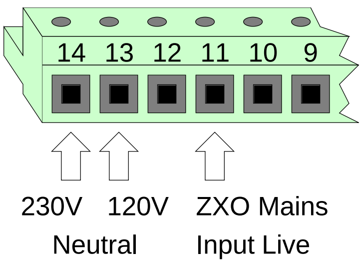
The Power Supply operates from 85 to 265V AC, and therefore needs no external set-up to operate from either 120 or 230V AC.

However the OMCU's lamp monitor Zero Crossover circuit requires setting. This setting is achieved by selecting the correct input connector socket on the High Voltage cable form.

If 120V setting is required, change the setting as detailed, before applying mains. The relevant connector socket positions for the 120V or 230V setting is described below.

Note that if OMCU lamp monitoring is not required, then the wires from the PSU can be left unconnected since the female bullets have plastic covers that naturally insulate them.

Cableform Position	**Voltage Supply**
PL2 pin 11	ZXO Mains Input (Mains Live)
PL2 pin 13	Neutral Return 120V Operation
PL2 pin 14	Neutral Return 230V Operation



Note 1: Before applying the mains' power, recheck the correct voltage setting has been selected and the Zero Crossover Mains' Input (ZXO Mains I/P) has been connected.

Note 2: Pins 11, 13 and 14 should be connected as shown on the first LMU I/O board only. These pins should be left unconnected on the second and third boards fitted to a unit.

If 120V operation is required then a different variant of the Voltage Monitor Transformer must be used. The 100V Welsh Office version is 667/7/25172/500, see section 5.2.7. A design for a 120V version would need to be requested.

6. TRAFFIC OUTSTATION COMMISSIONING

WARNING

THIS EQUIPMENT MAY ONLY BE COMMISSIONED BY SIEMENS TRAFFIC CONTROLS OR BY TRAINED PERSONNEL.

ENSURE THAT THE UNIT IS NOT CONNECTED TO THE PSTN LINE JACK UNIT AT THE COMMENCEMENT OF COMMISSIONING TESTS.

For Graphos see the Graphos Product Handbook 667/HB/31200/000 for the Commissioning Sequence (Section 14).

The following instructions are only relevant if the Traffic Outstation is being upgraded with a GEMINI^2 Processor card:

ZX0 WIRES FROM THE PSU TO THE FIRST LMU I/O BOARD (NEAREST CPU).

The red and black wires, which come from under the power supply cover through the ferrite, are at mains potential when the unit is switched on. For 230V operation, these wire connect to pins ‘14’ and ‘11’ on the expansion board connector ‘PL2’ (for full details of the connections see section 5.2.4 of this handbook which starts on page 74.)

The mains supply must be completely removed from the unit prior to:

- **Disconnecting these wires for any reason, e.g. replacing unit.**
- **Any ZX0 circuit setting adjustments as defined in section 5.2.4.**
- **Any operation that would leave these wires exposed.**

If, for any reason, these wires are left exposed and unattended (e.g. change out unit) they must be safely terminated with the unit unplugged from the mains’ supply. The unit must not have mains applied to it until the wires are connected or safely terminated, for example by removing additional wires so that only the bullet connections, which provide protection against accidental contact with mains potentials, remain.

General instruction - applicable to all versions of the Outstation:

During a unit change out, the Green Voltage Detector connections can be left intact on cableform 667/1/26586/000, which connects to the controller (as defined in section 5.6.2.3 which starts on page 85).

6.1 INTRODUCTION

The checklist on the following pages should be used to commission the Outstation applications if they are required.

The checklist should be followed in sequence unless a particular step is not required. Refer to the 'OMCU', 'Car Park [Count OMCU]', 'Bus [Processor]', VC [Vehicle Classifier], UTMC OTU and UTMC VMS columns to determine whether the step applies to the type of unit being commissioned. If the unit is to perform both OMCU and Bus Processor facilities for example, then all activities in both the 'OMCU' and 'BUS' columns should be undertaken.

Section 9, which starts on page 140, describes MOVA and includes its commissioning steps. If the OMCU and MOVA applications are required within the same unit, then the OMCU commissioning checklist must be followed **and then** the MOVA commissioning checklist.

In most cases, the unit has all of its timing and configuration data downloaded from the central office. On site set-up can be performed where required for Bus Processing functions, see section 13.10.

6.2 OMCU, Car Park and Bus Priority COMMISSIONING CHECKLIST

	OMCU	Car Park	BUS	CHECK	REFERENCE
1	✓	✓	✓	**Installation check** Check all the connections have been installed in accordance with the Customer Supplied Instation instructions.	Installation spec. produced by RMS Instation if available
2		✓		**Count Outstation Checks** The car park to be monitored should be checked to verify that: a) All the detection is working; b) Correct detectors are wired to the entry and exit loops. That the SYSTEM LED (LP1) is indicating the OMCU is powered and running.	
3	✓			**Controller Checks** The controller to be monitored should be checked to verify that: a) All lamps are working, including WAIT lamps; b) All the detection is working; c) All push buttons are working; d) The controller is fully serviceable and servicing all demands and extensions; e) The controller timing is correct; That the SYSTEM LED (LP1) is indicating the OMCU is powered and running.	

	OMCU	Car Park	BUS	CHECK	REFERENCE
4	✓	✓	✓	Ensure the RAM backup battery and the Support battery are both connected. If the modem has an on/off switch, ensure it is switched on.	5.2.8 & 5.6.11
5	✓	✓	✓	Plug the handset into the HANDSET connector and hit the <return> key a number of times, until the sign-on message 'SIEMENS OMCU' or the prompt character is displayed. NB: The firmware will auto-baud to 1200, 9600, 19200 and 57600 baud and requires the key presses to determine the baud rate. (Terminal should be set for: 1 x start bit, 7 x data bits, even parity and 1 x stop bit).	
6	✓	✓	✓	Check using the FLT code that the Outstation Fault logs only contain the 'Equipment Data Invalid' report – if not then initialise the OMCU and Bus Processor applications, using INI=1 and recheck. **Important:** Use INI=3 to completely re-initialise a combined OMCU and MOVA unit. See section 9.6.2 on page 152.	13.8
7	✓	✓	✓	Check with the Handset that the Outstation Operating Mode is "FIRST POWER UP", i.e. OPM <CR> responds with 'OPM:5'.	13.8
8	✓	✓	✓	Use the TOD command to set up the correct day, date and time.	13.8
9	✓	✓	✓	If digital I/O Ports are connected, check that they respond to detector and controller mode changes, etc, using the DIP handset command.	Instation config sheet & 13.4
10	✓			Check the OMCU mains state inputs respond to the monitored controller signals (phase greens, wait indicators, controller supply etc) using the MSI handset command.	Instation config sheets and 13.4
11	✓			Where fitted, check the current sensor input gives appropriate readings for the phase, during red, green, amber, etc. Also check that the magnitude of the reading corresponds with that expected for the phase lamp load using the KAC handset command. Typical values can be found in the Fault finding section.	Instation config sheets & 13.5
12	✓			Check that, where dimming is fitted, the KAC1 1 code shows the correct readings for both dim and bright states.	Instation config sheets & 13.5

	OMCU	Car Park	BUS	CHECK	REFERENCE
13	✓		✓	**DUSC Facility Check (If Configured)** The OMCU provides the ability to copy the detector inputs through to the outputs. This is controlled using the 'COD' handset command. This allows the VA operation to be maintained even though the OMCU is unconfigured. The BUS/MOVA I/O board provides changeover output relays. The 'inverse' sense would be selected when the 'normally closed' output relay contact is being used. Check that the Outputs from the OMCU are connected to the correct inputs on the Controller. Use handset command SOP to display OMCU outputs. Check that the green confirm inputs on the OMCU are connected to the correct outputs on the Controller. Use handset command DIP to display OMCU outputs.	13.14
14	✓		✓	If the OMCU is connected to a TR 0141 controller handset port, check that the controller can be interrogated through the OMCU using the XXC and XXO handset commands. Since the OMCU is not configured at this stage the SCT code may be used to initialise the OMCU UART to the appropriate configuration.	13.8
15	✓		✓	If the controller is an ST800/700 and will be monitored using the enhanced 141 serial link, check that the OMCU and ST800/700 firmware issues will support the link (use PIC commands).	See 4.2.6 for required firmware issues
16			✓	If required, set up the OMCU ID using the JID command (only necessary if customer requires ID to be configured before PSTN communication is established, e.g. TfL).	13.10
17			✓	If present, ensure the radio clock is functioning correctly using the RCS command.	13.8.5
18			✓	Use the DBM command to confirm that the RS485 channels are correctly connected and working. Monitor actual vehicles or use a dummy transponder or Protocol analyser to simulate messages. Note: If both LMU and Bus/MOVA I/O boards are used on the same unit, ensure the LMU I/O boards are issue 3 or later (otherwise the RS485 channels may not function).	5.6.4 and 13.8.8

	OMCU	Car Park	BUS	CHECK	REFERENCE
19	✓		✓	If the telephone line exists, plug in a telephone and dial the OMCU number, which should give engaged tone. If the telephone works, and there is someone at the Instation, it is possible to check the download and monitoring. Normally the Instation is notified that the OMCU is ready to be tested at a later date. Go to step 29.	
20	✓		✓	**Dial Out & Dial In Checks** Connect OMCU Telephone Connector and a Telephone Handset (e.g. BT ref. 248/2) into a Dual Outlet Adapter (BT ref. LJU10/3A). Connect the Dual Output Adapter into the line Jack Unit.	
21	✓		✓	Use the Telephone handset to dial the Instation Operators and inform them the OMCU is ready for Configuration Data Download. (Preferably within an agreed time, e.g. 5 minutes.) DO NOT FORGET TO REPLACE TELEPHONE RECEIVER.	
22	✓		✓	Check that, within the agreed time, the Telephone Handset Bell (Bleeper, etc.) rings twice at which point the OMCU answers.	
23	✓		✓	The Comms LED (LP2) on the processor should show data being transmitted in both directions by flashing. (If the LED does not flash, lift the telephone receiver, it is probably a voice call.)	7.3.1
24	✓		✓	OMCU Handset “Operating Mode” should show “CONFIG DOWNLOAD” (OPM : 2).	13.8
25	✓		✓	After a period of time, the Comms LED (LP2) on the processor should go off, indicating that the call has terminated. The OMCU Handset “Operating Mode” should show “MONITORING” (OPM : 0) in which case continue with the following steps. If OPM is not 0, go back to step 20.	13.8

	OMCU	Car Park	BUS	CHECK	REFERENCE
26	✓	✓	✓	**<u>Support Battery Check</u>** With the battery connected, check that when the power is removed from the OMCU, the OMCU within one minute dials the Instation and a mains failure report' is logged on the Instation system printer. If the battery does not support the OMCU, then charge the Support battery for at least 10 minutes by restoring the mains and repeat this test. Restore power to the OMCU and check that the OMCU reports "mains restoration" to the Instation within one minute.	
27	✓			**<u>OMCU-ST800/700 Link</u>** If the controller is an ST800/700, monitored using the enhanced 141 serial link, check that the enhanced link is operating, using the EEL command (EEL:3 is OK).	4.2.6 for facility description & 13.8 for EEL command
28		✓		**<u>Car Park Count Check</u>** When OMCU is being used to provide car park count facility then all configuration data is set up via the handset. Use handset command 'LDV=3' to set up the default car park count data. See section 10 for details of this facility.	Section 10 for facility description
29			✓	**<u>SIETAG Vehicle Detections Routed via 141 Port Check</u>** When the OMCU is being used to provide routing of SIETAG vehicle detections via the 141 serial port then all configuration data is set up via the handset. Use handset command 'LDV=4' to set up the default configuration data.	
30		✓		**<u>PAKNET check (if fitted)</u>** With car park count systems the PAKNET interface is used to transmit data to the Instation. The following parameters must be set-up via the handset. a) Enable the PAKNET interface via handset command RCT. b) Set the Instation PAKNET address via handset command RCA. c) Set the address of the OMCU via handset command ADR. Ensure that the pad is powered via a din rail mounted 12V relay. See section 10.5.2.	Section 10 for facility description

	OMCU	Car Park	BUS	CHECK	REFERENCE
31	✓		✓	**Conclusion Of Tests** Remove the Dual Outlet telephone adapter from the Line Jack Socket and insert the OMCU Telephone connector.	
32	✓	✓	✓	Check that the OMCU Fault Log is clear using the FLT handset code.	13.6
33	✓		✓	Disconnect any other test equipment. **The OMCU is Ready For Service**	
34	✓		✓	If the OMCU is to be left not powered after the commissioning is complete, then both the RAM Backup and UNIT Support Batteries must be disconnected. For RAM backup – re-insert the insulating strip. For the Support Battery – remove the Battery Fuse and 'tape' it to the front panel of the unit.	5.2.8 & 5.6.11

6.3 Vehicle Classifier, UTMC OTU and VMS COMMISSIONING CHECKLIST

	VC	UTMC OTU	UTMC VMS	CHECK	REFERENCE
1	✓	✓	✓	**Installation check** Check all the connections have been installed in accordance with the Customer Supplied instructions.	
2	✓			**Vehicle Classifier Outstation Checks** Any associated controller should be checked to verify that: a) All the detection is working; For a ‘stand-alone’ VC outstation check that: a) The VC has been assembled as defined in ‘Vehicle Classifier Build Method’ (667/CC/30460/000); b) All the detection is working. The Outstation should be checked to verify that: a) Any modem has been installed correctly and connected to the outstation; The System LED (LP1) is indicating the Outstation is powered and running.	
3		✓		**UTMC Outstation Checks** The Outstation should be checked to verify that: a) The UTMC modem has been installed and connected to the appropriate communications line; b) The modem Ethernet cable is connected to the outstation; c) If additional SCOOT detectors are fitted then check that these are functioning correctly; d) The System LED (LP1) is indicating the Outstation is powered and running. The UTC interface is functioning: Freestanding unit – using commands GOO and GOD to simulate force data to the controller. The reply data can be viewed using the DIP command. For the semi-integral unit – use EEL command to check that the enhanced serial link is established.	13.20.5 13.4 13.8

	VC	UTMC OTU	UTMC VMS	CHECK	REFERENCE
4			✓	**Variable Message Sign Checks** The variable message sign being controlled should be checked to verify that: a) The control logic is functioning; b) The communications interface to the Outstation is working; c) Any associated sign solar cells are working. The Outstation should be checked to verify that: a) The UTMC modem has been installed and connected to the appropriate communications line; b) The modem Ethernet cable is connected to the outstation; c) The System LED (LP1) is indicating the Outstation is powered and running.	
5	✓	✓	✓	Ensure the RAM backup battery and the Support battery are both connected. If the modem has an on/off switch, ensure it is switched on.	5.2.8 & 5.6.11
6	✓	✓	✓	Plug the handset into the HANDSET connector and hit the <return> key a number of times, until the sign-on message 'SIEMENS' or the prompt character is displayed. NB: The firmware will auto-baud to 1200, 9600, 19200 and 57600 baud and requires the key presses to determine the baud rate. (Terminal should be set for: 1 x start bit, 7 x data bits, even parity and 1 x stop bit).	
7	✓	✓	✓	Check using the FLT code that the Outstation Fault logs only contain the 'Equipment Data Invalid' report – if not then initialise the Outstation using INI=1 and recheck.	13.8
8	✓	✓	✓	Check with the Handset that the Outstation Operating Mode is "FIRST POWER UP", i.e. OPM <CR> responds with 'OPM:5'.	13.8
9	✓	✓	✓	Use the TOD command to set up the correct day, date and time.	13.8
10	✓	✓	✓	If digital I/O Ports are connected, check that they respond to detector and controller mode changes, etc, using the DIP handset command.	Instation config sheet & 13.4

	VC	UTMC OTU	UTMC VMS	CHECK	REFERENCE
11	✓	✓		If the outstation is connected to a TR 0141 controller handset port, check that the controller can be interrogated through the Outstation using the XXC and XXO handset commands. Since the outstation is not configured at this stage the SCT code may be used to initialise the UART to the appropriate configuration.	13.8
12		✓		If the controller is an ST800/700 and will be monitored/controlled using the enhanced 141 serial link, check that the ST800/700 firmware issues will support the link (use PIC commands).	See 4.2.6 for required firmware issues
13	✓			If present, ensure the radio clock is functioning correctly using the RCS command.	13.8.5
14	✓			If the telephone line exists, plug in a telephone and dial the Outstation number, which should give engaged tone. If the telephone works, and there is someone at the Instation, it is possible to check the download and monitoring.	
15	✓			**<u>Dial Out & Dial In Checks</u>** Connect Outstation Telephone Connector and a Telephone Handset (e.g. BT ref. 248/2) into a Dual Outlet Adapter (BT ref. LJU10/3A). Connect the Dual Output Adapter into the line Jack Unit.	
16	✓			Use the Telephone handset to dial the Instation Operators and inform them the Outstation is ready for Configuration Data Download. (Preferably within an agreed time, e.g. 5 minutes.) DO NOT FORGET TO REPLACE TELEPHONE RECEIVER.	
17	✓			Check that, within the agreed time, the Telephone Handset Bell (Bleeper, etc.) rings twice at which point the Outstation answers.	
18	✓			The Comms LED (LP2) on the processor should show data being transmitted in both directions by flashing. (If the LED does not flash, lift the telephone receiver, it is probably a voice call.)	7.3.1
19	✓			Outstation Handset “Operating Mode” should show “CONFIG DOWNLOAD” (OPM : 2).	13.8

	VC	UTMC OTU	UTMC VMS	CHECK	REFERENCE
20	✓			After a period of time, the Comms LED (LP2) on the processor should go off, indicating that the call has terminated. The Outstation Handset "Operating Mode" should show "MONITORING" (OPM : 0) in which case continue with the following steps. If OPM is not 0, go back to step 15.	13.8
21	✓			**Communications to Associated UVMS** **Sign Control via Serial Port:** With reference to the site's configuration information, use the test Handset commands: VRX=x y <CR> VRC=1 <CR> This will force the Vehicle Classifier to simulate a trigger for the particular event ('x y') and to send a message to the associated sign. Check that the sign displays the expected message. **Other VC Control Inputs & Outputs:** With reference to the site's configuration information, use the test Handset commands: SOP (for outputs) DIP (for inputs)	13.18.1.10 13.8 13.4
22	✓			**VC Detector Loop Configuration** **Loop Sensitivity:** 0.08% **Loop Size:** Each loop pair typically 2 metres long and spaced 3.5 metres apart. These dimensions are Instation configured items. **Note:** This information only applies to Siemens ST4R detectors. Specific loop installation details can be found in 667/HE/20663/000	

	VC	UTMC OTU	UTMC VMS	CHECK	REFERENCE
23	✓	✓	✓	**Software Licence Codes** **Vehicle Classifier:** The VC software licence code is controlled by the Instation and is downloaded along with the VC configuration data. The licence code is obtained from Poole. **UTMC OTU, VMS & 3G Router:** These software licence codes are supplied from Poole and before this can be done the Serial Number of the associated GEMINI² Processor must be obtained. This can be found by either looking on the card itself or using the Handset code HIC. Poole will then supply two numbers: 1. One represents the code; 2. The other represents the facilities enabled. The ‘code’ is then entered into the Outstation using the following command: LIN=xxxx xxxx <CR> where xxxx xxxx represents the unique ‘code number’ for the site. The ‘facility’ is then entered into the Outstation using the following command: LIF=yyyyyyyy <CR> where yyyyyyyy represents the ‘facilities’ available on the site.	13.20.4 13.19 13.19
24		✓	✓	**Emergency Licence Codes** In cases of emergency when it is not possible to contact Poole for licence codes the following ‘Emergency Code’ can be used LIN=9999 9999 <CR> This will enable all facilities for a period of 7 days only.	13.19
25	✓	✓	✓	**Support Battery Check** With the battery connected, check that when the power is removed from the Outstation the unit still functions correctly. If the battery does not support the outstation, then charge the Support Battery for at least 10 minutes by restoring the mains and repeat this test. Restore power to the unit.	
26	✓	✓		**ST800/700 Link** If the associated controller is an ST800/700 it can be monitored/ controlled using the enhanced 141 serial link, check that the enhanced link is operating, using the EEL command (EEL:3 is OK).	4.2.6 for facility description & 13.8 for EEL command

	VC	UTMC OTU	UTMC VMS	CHECK	REFERENCE
27		✓		**Configuring the UTMC OTU** Configuration of the OTU Outstation is described section 11.	11
28			✓	**Configuring the UTMC VMS** Configuration of the VMS Outstation is described in section 12.	12
29	✓			**Conclusion Of Tests** Remove the Dual Outlet telephone adapter from the Line Jack Socket and insert the Outstation Telephone connector.	
30	✓	✓	✓	Check that the Outstation Fault Log is clear using the FLG and FLT handset codes.	13.6
31	✓	✓	✓	Disconnect any other test equipment. **The Outstation is Ready For Service**	
32	✓	✓	✓	If the Outstation is to be left not powered after the commissioning is complete, then the UNIT Support Batteries must be disconnected – remove the Battery Fuse and ‘tape’ it to the front panel of the unit.	5.6.11

7. MAINTENANCE

WARNING

THE MAINS SUPPLY TO THE UNIT AND THE ASSOCIATED TRAFFIC CONTROLLER MUST BE SWITCHED OFF PRIOR TO ANY MAINTENANCE WORK BEING CARRIED OUT ON THE UNIT.

ANY UNAUTHORISED USE OF COMPONENTS OR MODIFICATIONS OR ENHANCEMENTS WITHOUT PRIOR APPROVAL BY SIEMENS TRAFFIC CONTROLS COULD RESULT IN INVALIDATION OF THE TYPE APPROVAL OF THIS PRODUCT.

THIS EQUIPMENT MAY ONLY BE MAINTAINED BY SIEMENS TRAFFIC CONTROLS OR BY TRAINED PERSONNEL.

THIS UNIT CONTAINS BATTERIES WHICH, UNDER FAULT CONDITIONS, MAY LEAK HAZARDOUS SUBSTANCES. CARE MUST BE TAKEN WHEN REPLACING BATTERIES OR HANDLING THE UNIT.

REPLACE BATTERIES WITH ONLY THE SAME OR EQUIVALENT TYPE. DISPOSE OF USED BATTERIES BY RETURNING TO POOLE SITE OR DEPOT. BATTERIES REPLACED INCORRECTLY COULD CAUSE AN EXPLOSION.

For Graphos see the Graphos Product Handbook 667/HB/31200/000 (Section 16 – Periodic Inspection and Preventative Maintenance) for the Maintenance Sequence.

The following instructions are only relevant if the Traffic Outstation is being upgraded with a GEMINI^2 Processor card:

ZX0 WIRES FROM THE PSU TO THE FIRST LMU I/O BOARD (NEAREST CPU).

The red and black wires, which come from under the power supply cover, through the ferrite are at mains potential when the unit is switched on. For 230V operation, these wire connect to pins ‘14’ and ‘11’ on the expansion board connector ‘PL2’ (for full details of the connections see section 5.2.4 of this handbook which starts on page 74.)

The mains supply must be completely removed from the unit prior to:

- **Disconnecting these wires for any reason, e.g. replacing unit.**
- **Any ZX0 circuit setting adjustments as defined in section 5.2.4.**
- **Any operation that would leave these wires exposed.**

If, for any reason, these wires are left exposed and unattended (e.g. change out unit) they must be safely terminated with the unit unplugged from the mains' supply. The unit must not have mains applied to it until the wires are connected or safely terminated, for example by removing additional wires so that only the

bullet connections, which provide protection against accidental contact with mains potentials, remain.

General instruction – applicable to all versions of the Outstation:

During a unit change out, the Green Voltage Detector connections can be left intact on cableform 667/1/26586/000, which connects to the controller (as defined in section 5.6.2.3 which starts on page 85).

7.1 INTRODUCTION

With authorisation from Siemens Traffic Controls, the user or a third party may carry out first line maintenance work on the unit. To obtain authorisation the user or third party must undergo a basic training course, provided by Siemens Traffic Controls.

7.2 FIRST LINE

The authorised agent is restricted to first line maintenance work only. Maintenance work beyond first line should be referred to Siemens Traffic Controls.

The authorised agent may carry out the first line maintenance, detailed as follows:

(a) Board Replacement
(b) Fuse Replacement
(c) Connector Replacement
(d) Interface Cable Replacement
(e) Battery Replacement
(f) Modem Replacement
(g) PSU Replacement

7.3 FAULT FINDING

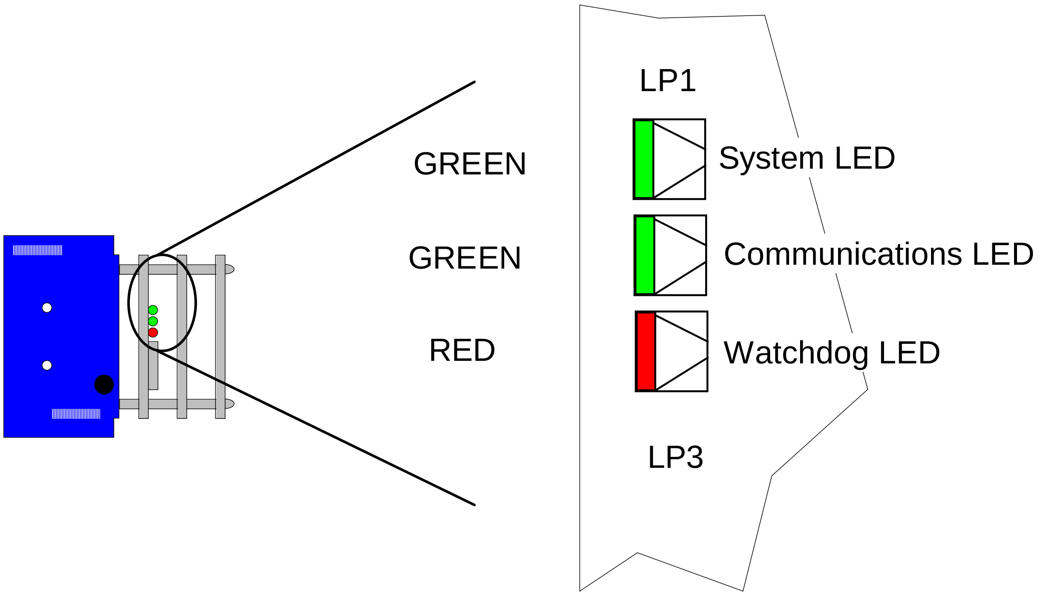
The unit is a modular design, which simplifies fault finding to a board or assembly level. Section 8, which starts on page 124, provides guidelines to fault finding and repair to modular level. The status LED indicators on the processor board provide a visual identification of the fault condition existing on the unit.

The OMCU software has a diagnostic routine, which when accessed by the handset, can identify many other types of fault conditions. See section 11 for detailed handset command codes and replies, along with their associated fault indications.

Note that the handheld handsets commonly used to interrogate traffic controllers and other traffic equipment (including Outstations) cannot be used to interrogate the MOVA application since it requires menu driven application running on a PC. See section 9, which starts on page 140, for more information about the MOVA unit.

7.3.1 LED Indications

The three LED indicators on the processor board give the following status or fault indication:



LED Name	State	Indication
System LED (GREEN)	OFF	No power or processor error
	Slow Flash *	Normal operation
	Fast Flash *	Abnormal condition detected – check fault log. Example conditions are shown in the table below.
	Heart Beat *	Main software not executing. Awaiting software update.
	ON Steady	Processor error
Communications LED (GREEN)	OFF	No data being received from the network
	OFF with brief flashes ON	Data being transmitted/received but communications not established
	ON with brief flashes OFF	Communications established and data being transmitted/received.
	ON	Communications established, but no data being transmitted/received. NB: For PAKNET, the LED remains on after a call, until the next periodic modem initialisation.
Watchdog LED (RED)	OFF	The processor is running and keeping the watchdog triggered.
	ON	The hardware watchdog has timed out

* The slow flash rate is 1.6sec ON / 1.6sec OFF, whereas the fast flash rate is 4 times faster. The heart beat is a regular double flash.

NB: See section 13.20.4 for LED displays during self-test.

Possible Causes for Fast Flashing System LED	
Application	**Possible Condition**
Any	The outstation may be unconfigured, monitoring turned off, config data invalid or config being downloaded. Check the OPM value to determine if any of these conditions apply. Also check FLT and FLG for any active/logged faults.
Any	The outstation may have detected a 'hard' error condition, e.g. repeated failure of internal software check. Check if the outstation is transmitting an error code on the handset port i.e. connect a terminal configured for 1200 baud, 7 bits, even parity and note any error messages. Alternatively, power the unit off/on and use the handset to examine fault data – see handset commands PUD, SEC and SEB.
OMCU	There may be urgent faults present which have not yet been reported to the Instation (the OMCU will be either dialling the Instation or in PSTN retry).
MOVA	MOVA may be disabled or may have been switched off control. NB: After any power break, the MOVA unit will remain off control until the controller has performed one complete cycle in its fallback mode. This is known as the MOVA warm-up cycle.
MOVA	The MOVA unit may have confirmed one or more faulty detectors (the 'fault' will not be cleared until the error log is manually cleared).
MOVA	The MOVA software may have failed internally.
UTMC OTU	The outstation may have lost communications with the UTC Instation. Check GOE and GCT. Also check the communication configuration parameters IPA and GCW.

7.4 ROUTINE MAINTENANCE

Units only require annual maintenance, which can be performed at the same time as the inspection of associated controller or other equipment. On these visits, trained personnel must switch off the mains power to the controller and the unit.

7.4.1 Annual Maintenance

Switch the mains power off and check the unit is supported by the battery for a minimum of 10 minutes. Do this by inspecting the SYSTEM LED and waiting until the power failure has been reported to the Instation. This tests the condition of the Unit Support battery, and if the unit loses support within 10 minutes, the battery must be replaced. After the 10 minutes is up, remove the battery fuse, which will power down the unit.

Now carry out all the following procedures:

(a) General inspections of the unit in situ for any contamination, overheating of components, corrosion or battery leakage. Rectify where necessary.

(b) Check the tightness of all interface cables and re-tighten where necessary.

(c) Check the condition of the interface cables; that there is no chafing of the insulation and that the general condition of the insulation is good. Replace any damaged or worn cables.

(d) Check the mechanical tightness of the main securing screws of unit and re-tighten where necessary.

(e) Restore mains power to the controller and the unit. Check the controller and other associated equipment is operating correctly. Then check the unit has retained its configuration by observing the SYSTEM LED returns to its normal operating state, i.e. flashing slowly. In the case of an OMCU, this will be after the power restoration has been reported to the Instation; or in the case of a MOVA unit, once the controller has performed one complete cycle.

(f) If the SYSTEM LED continues flashing quickly then see section 7.3.1 and use the handset port to examine the unit. This check only tests the RAM memory support battery has not failed. It does not check its capacity and ability to support the RAM during long power cuts.

If the unit is connected to the PSTN and has not already reported the power off/on to the Instation in step (e), force the unit to call the central office and prove communications to the operator. This can be achieved using the OMCU handset command CAL=1.

Note: Routine replacement of fuses is NOT considered necessary.

This completes the annual maintenance of the unit.

7.4.2 5-Yearly Maintenance

It is recommended that every five years, in addition to the annual maintenance routine described above, all batteries be replaced. See Section 7.6.3 for part numbers.

7.5 PART NUMBERS

Plug 3 pin Rectangular 3A.. 508/4/29174/004
Detector 11” Rack Kit 667/1/20690/000
Detector 19” Rack Kit 667/1/20690/001
Traffic O/S Mounting Kit 667/1/26577/000
GEMINI^2 PSTN Outstation 667/1/32600/001
GEMINI^2 GSM Outstation.. 667/1/32600/002
GEMINI^2 Car Park Outstation.. 667/1/32600/003
GEMIN^{2}I UTMC Outstation.. 667/1/32600/004
GEMINI^2 Upgrade Kit 667/1/32600/100
I/O Expansion Kit (with cable & voltage transformer) 667/1/28853/001
I/O Expansion Kit (with cable only).. 667/1/28853/000

Bus/MOVA I/O Expansion Kit (with cables)	667/1/28856/000
Digital I/O Expansion Kit (with cables)	667/1/28856/001
3RD Party ELV AC I/O Expansion Kit (with cable & voltage transformer)	667/1/28857/001
3RD Party ELV AC I/O Expansion Kit (with cable only)	667/1/28857/000
PSTN Modem Kit	667/1/26598/005
GSM Modem Kit	667/1/26598/020
UTMC Outstation Kit	667/1/30625/000
GEMINI^2 Processor PCB Assembly	667/1/26608/999
GEMINI^2 Aux PSU PCB Assembly	667/1/26560/000
Current Monitoring Transformer	667/7/25171/000
Voltage Monitoring Transformer	667/7/25172/000
TR0141 Cable Standard	667/1/26579/000
TR0141 Cable Peek/C3000/TCL/Monitron	667/1/26579/001
TR0141 Cable Microsense	667/1/26579/002
Cableform Low Voltage (1.5m)	667/1/26585/000
Cableform Low Voltage (1m)	667/1/26585/001
Bus/MOVA I/O Expansion Cable	667/1/26585/003
Bus/MOVA RS485 I/O Cable	667/1/26585/004
Cableform High Voltage	667/1/26586/000
Cableform Low Voltage Output	667/1/26589/000
CPU I/O Cable	667/1/30607/000
Basic GEMINI^2 Outstation (CPU & PSU only, no modem)	667/1/32605/000
MOVA I/O All Controllers	667/1/28855/001
OMU/OTU Supply Kit	667/1/20244/000

7.6 SPARES

The following spares should be held by the authorised maintenance agent. Some of the parts listed in Section 7.5 above are also available as spares. Contact Siemens Poole for details.

7.6.1 General

LMU I/O PCB Assembly	667/1/26570/000
3RD Party ELV AC LMU I/O PCB Assembly	667/1/26570/100
BUS / MOVA I/O PCB Assembly	667/1/27881/000
Digital I/O PCB Assembly	667/1/27881/001
PSU I/P 85-264V AC O/P 13.65V 3A	667/7/30613/000
Voltage Sensor (for Welsh Office only)	667/7/25172/500

7.6.2 Interface Cables

OMCU/LMU High Voltage Cable	667/1/26586/800

BUS / MOVA I/O Cable (Without T/Bs) 667/1/26585/005
BUS / MOVA I/O Cable (TfL)... 667/1/26585/010
Analogue Connector.. 508/4/26352/017
MOVA to T400/ST800/700 Cable.. 667/1/26604/000
MOVA Terminal Block Kit.. 667/1/26605/000
CPU I/O Cable 667/1/30607/000

7.6.3 Batteries

RAM Back-up Battery – 3V Coin Cell... 418/4/53433/000
Outstation Back-up Battery – 12V Sealed Lead Acid 418/4/42314/010

Note:

1. Lead Acid Batteries have a one-year shelf life, if stored at below 20°C, at which stage they must be recharged to maintain their efficiency. Consult the manufacturer's data for this recharge procedure. It is recommended that batteries should not be held as spares, but ordered as and when required from Siemens Poole.
2. When replacing the battery take particular note of its orientation. The battery must not be installed upside down (i.e. The connections tags must be pointing upwards). See section 5.4.1 on page 77.

7.6.4 Fuses

Lead Acid Battery Fuse (5mm x 20mm – 5A 250V QB) 518/4/90285/008
Processor (5mm x 20mm – 250mA 250V QB) 516/4/90285/011
BUS/MOVA I/O (5mm x 20mm – 250mA 250V QB).............................. 518/4/90285/011
Fuse Holder for BUS/MOVA I/O Fuse.. 516/4/97060/000

8. FAULT FINDING AND REPAIR

For Graphos see the Fault Finding and Troubleshooting Guide 667/HE/31200/000 for the Fault Finding and Repair Sequence.

8.1 INTRODUCTION

The following section comprises of battery, telephone connection information and warnings, together with quick reference tables, to provide a guide to aid fault tracing on the unit for first line maintenance purposes:

Table 8.4.1	:	PSTN Comms. Failures
Table 8.4.2	:	GSM Comms. Failures
Table 8.4.3	:	PAKNET Comms. Failures
Table 8.4.4	:	UTMC Comms. Failures
Table 8.4.5	:	Modem Compatibility
Table 8.5	:	Equipment Failures
Table 8.6	:	Power Failures

Section 11 provides a description of the codes that can be used in fault finding. These codes are often referred to in tables 8.4 to 8.6 as HANDSET CODE.

8.2 BATTERY FAILURES

If one of the batteries has failed, it must be replaced with the specified battery or equivalent (see section 7.6.3 on page 123). Exercise great care when handling old batteries, which may be leaking, and during replacement of new ones, to ensure no damage occurs to either.

WARNING

OLD BATTERIES MUST BE DISPOSED OF IN ACCORDANCE WITH THE ‘CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH REGULATIONS 1988’.

SPENT BATTERIES MUST BE DISPOSED THROUGH AN APPROVED HAZARDOUS WASTE DISPOSAL CONTRACTOR.

DO NOT PUNCTURE BATTERIES.

DO NOT DISPOSE OF BATTERIES IN ANY FIRE.

DO NOT ATTEMPT TO RECHARGE FAILED BATTERIES.

THE NEW BATTERY MUST BE INSTALLED THE SAME WAY ROUND.
FOR THE LEAD ACID – CONNECTION TAGS MUST POINT UPWARDS.
FOR THE COIN CELL – ‘+’ SYMBOL UPPERMOST

8.3 TELECOMMUNICATIONS APPROVAL WARNING

The PSTN Modem is approved for connection to the Public Switched Telephone Network. This approval may be invalidated if any authority other than the original manufacturer repairs the equipment.

8.4 COMMUNICATIONS FAILURES

8.4.1 TABLE FOR PSTN COMMUNICATIONS FAILURES

Note that use of the term ‘modem’ applies equally to PSTN modems and GSM modules.

Symptom	Possible Diagnosis	Action to Check Diagnosis
(a) Unit will not answer Instation calls	PSTN line out of order or disconnected	Check the line by disconnecting the unit from the line socket and inserting a telephone handset. Try a voice call to and from the service depot. If line is OK, the modem is powered and its connections are OK, replace modem.
	Telephone cable disconnected	Check the PSTN connections to the modem and the Line connection socket. If modem is powered, and connections OK, replace the modem.
	Modem failed	Check if the modem’s ‘‘ON” LED is lit, if yes replace modem. If no check that the modem is switched on and voltage on the modem power cable is present (see section 5.2.2 on page 71). If no voltage present, replace board providing the power (normally the processor card). NB: If the unit comms LED is repeatedly flashing, the unit is attempting (but failing) to initialise the modem. Replace modem and/or check compatibility.
	Unit out of service	Check that the statuses of the LEDs on the Processor board are correct (see section 7.3 which starts on page 118). If not, power down and power up the unit. If fault persists, replace the processor board.
	Unit power failed	Check that the mains input to the unit is present. If yes, replace the unit’s PSU. If no, then check the mains supply and fuses.
	Modem incompatible with Instation modem	Check that the unit and Instation are using compatibly configured modems. Refer to section 8.4.4.

Symptom	Possible Diagnosis	Action to Check Diagnosis
(b) Unit will not dial Instation	Instation Number incorrect.	Check the configured Instation telephone number is correct using CTN and TNP (section 13.7 on page 239). If correct replace modem, if not reload the unit's configuration.
	Unit in a retry sequence	Check the unit is in a retry sequence using RSC and RTR (section 13.7 on page 239). If not replace modem.
	PSTN line out of order or disconnected	Check the line by disconnecting the unit from the line socket and inserting a telephone handset. Try a voice call to and from the depot. If line OK, modem is powered, and connections OK, then replace modem.
	Telephone cable disconnected	Check the PSTN connections to the modem and the Line connection socket. If modem is powered, and connections OK, then replace modem.
	Modem failed	Check if the modem's ''ON" LED is lit, if yes replace modem. If no check the modem is switched on and voltage on the modem power cable (see section 5.2.2 on page 71). If no voltage present, replace the board providing the power (normally the processor card).
	Unit out of service	Check that the statuses of the LEDs on the Processor board are correct (see section 7.3 which starts on page 118). If not power down and power up the unit. If fault persists, replace the processor board.
	Modem incompatible with Instation modem	Check that OMCU and Instation are using compatibly configured modems. Refer to section 8.4.4.
(c) Download failure	Wrong configuration for the unit or faulty unit	Check unit can support facilities being configured. If not, load the corrected configuration. If yes, replace the unit's processor board and re-configure. If fault still persists replace the unit.

Symptom	Possible Diagnosis	Action to Check Diagnosis
(d) Unit to Instation link communications not completed or intermittent	PSTN line intermittent	Check using handset codes CDC, CTR and MDC, what types of faults and the rate of their occurrences (see section 13.7). If this information indicates an intermittent PSTN line, request a line check by the appropriate authority.
	Modem intermittent	Check using handset codes CDC, CTR and MDC, what types of faults and the rate of their occurrences (see section 13.7). If this information indicates an intermittent Modem, check if the modem power and data connectors are securely inserted. If yes, then replace the modem and its cables. If the fault still persists, replace the unit.
	Communications Problems	Check the modem power supply is stable and to specification (see section 5.2.2 on page 71). If yes, replace the modem and its cables. If no, replace the board that provides the modem power (normally the processor card). If problems persist, request a line check by the appropriate authority.

8.4.2 TABLE FOR GSM COMMUNICATIONS FAILURES

Note that use of the term ‘modem’ applies equally to GSM modules.

Symptom	Possible Diagnosis	Action to Check Diagnosis
(a) Unit will not answer Instation calls	GSM Network unavailable or blocked.	Check with the Service provider (e.g. BT Cellnet or Vodaphone), that the particular SIM Card / phone number are enabled for DATA and are not in any way blocked. The service provider will be able to check the phone number and SIM card through their network. Note: PLEASE note any network restrictions that may apply, which are noted in the GSM modem installation and commissioning section. It is possible that some SIM cards may have one number for data and another for voice. It must be ensured that the correct number is used. If only ONE number is provided it MUST be DATA only.
	Antenna cable disconnected	Check the connections between the modem and the antenna. The antenna should be mounted on the signal pole closest to the controller cabinet. If modem is powered, and connections OK, replace the modem.
	OMCU to GSM communications	Check that the OMCU comms LED is not continually flashing as this indicates the OMCU is failing to communicate with the GSM modem. Check the modem to OMCU connections; check that the cable is plugged into PL2 on the OMCU processor and into the modem. Check that the modem comms are set up correctly as described in section 2.6.2. Replace cable / OMCU / Modem until successful comms achieved.

Symptom	Possible Diagnosis	Action to Check Diagnosis
(a) Unit will not answer Instation calls (continued)	GSM Modem failed	Check if the modem's ''ON" LED is lit. (NB On the GSM modem this is a small LED on the top surface of the modem near the SIM Card entry point. Once installed it is likely to be on the modem surface nearest the Outstation PSU plate and so its reflection may be easier to see. The Cinterion modem LED has 3 states – Constant On – Powered correctly and service available. Flashing – Powered but GSM service is not available. Off – No power to GSM modem. The Sequoia SQ864 is slightly different:- Flash rate once per second - Net search / not registered / turning off Slow rate once every 3 s - Registered full service Constant ON - Ringing OR call in progress OFF - Module powered down Check that the modem is switched on and voltage on the modem power cable is present (see section 5.2.2 on page 71). If no voltage present, replace the board providing the power (normally the processor card). NB: If the OMCU's comms LED is repeatedly flashing, the unit is attempting (but failing) to initialise the modem. Replace modem and/or check compatibility. See section 8.4.4 Modem Compatibility or 2.6.2.1 SQ864 modem
	Unit out of service	Check that the statuses of the LEDs on the Processor board are correct (see section 7.3 which starts on page 118). If not, power down and power up the unit. If fault persists, replace the processor board.
	Unit power failed	Check that the mains input to the unit is present. If yes, replace the unit's PSU. If no, then check the mains supply and fuses.

Symptom	Possible Diagnosis	Action to Check Diagnosis
	Modem incompatible with Instation modem	Check that the unit and Instation are using compatibly configured modems. Refer to section 8.4.4 and
	Instation number incorrect	Check the configured Instation telephone number is correct using CTN and TNP (section 13.7 on page 239). If correct replace modem, if not reload the unit's configuration.

Symptom	Possible Diagnosis	Action to Check Diagnosis
(b) Unit will not dial Instation	Unit in a retry sequence	Check the unit is in a retry sequence using RSC and RTR (section 13.7 on page 239). If not replace modem.
	GSM Network unavailable or blocked	Ref above
	Antenna cable disconnected	Ref above.
	GSM Modem failed	Ref above
	Unit out of service	Ref above
(c) Download failure	Modem incompatible with Instation modem	Check that OMCU and Instation are using compatibly configured modems. Refer to section 8.4.4.
(d) Unit to Instation link communications not completed or intermittent	Wrong configuration for the unit or faulty unit	Check unit can support facilities being configured. If not, load the corrected configuration. If yes, replace the unit's processor board and re-configure. If fault still persists replace the unit.
	GSM Service Intermittent	Check using handset codes CDC, CTR and MDC, what types of faults and the rate of their occurrences (see section 13.7). If this information indicates an intermittent GSM Service, request a check by the appropriate Service provider.

Symptom	Possible Diagnosis	Action to Check Diagnosis
	Modem intermittent.	Check using handset codes CDC, CTR and MDC, what types of faults and the rate of their occurrences (see section 13.7). If this information indicates an intermittent modem, check if the modem power and data connectors are securely inserted. If yes, then replace the modem and its cables. If the fault still persists, replace the unit.
	Communications Problems	Check the modem power supply is stable and to specification (see section 5.2.2 on page 71). If yes, replace the modem and its cables. If no, replace the board that provides the modem power (normally the processor card). If problems persist, request a service check by the appropriate authority.

8.4.3 TABLE FOR PAKNET COMMUNICATIONS FAILURES

Note that use of the term 'modem' applies equally to PAKNET modules.

Symptom	Possible Diagnosis	Action to Check Diagnosis
(a) Unit will not communicate with the Instation	PAKNET Network unavailable.	Check with the Service provider (e.g. Vodafone), that the there is no problem with the PAKNET service from the site's base-station or call the Siemens UTC Support number 01202 782440.
	Antenna cable disconnected	Check the connections between the modem and the antenna. The antenna should be mounted on the signal pole closest to the controller cabinet.
	Outstation power failed	Check that the mains input to the unit is present. If yes, replace the unit's PSU. If no, then check the mains supply and fuses.
	Outstation out of service	Check that the statuses of the LEDs on the Processor board are correct (see section 7.3 which starts on page 118). If not, power down and power up the unit. If fault persists, replace the processor board.

<table>
<tr><th>Symptom</th><th>Possible Diagnosis</th><th>Action to Check Diagnosis</th></tr>
<tr><td rowspan="2"></td><td>Examine Fault Log</td><td>Check using handset codes FLG and FLT for PAKNET related comms faults (PCF see section 13.6.2). This will give information on when faults have occurred.</td></tr>
<tr><td>Processor to PAKNET connections</td><td>Check the modem to processor connections; check that the cable is plugged into PL2 on the processor and into the modem. Check the power cable is correctly installed at both the modem and processor.</td></tr>
<tr><td rowspan="2">(a) Unit will not communicate with the Instation (continued)</td><td>Modem power supply failure</td><td>Check if the modem’s ‘‘ON” LED is lit. The LED has 3 states –
Constant On – Powered correctly and service available.
Flashing – Either Powered but Paknet service is not available or communicating with the Instation (confirm by looking for a similar state on the CPU card Comms Led (LP 2)).
Off – No power to modem. This may be because the software is timing a retry delay, before attempting to restore communications.
Power the outstation off/on so that it will attempt to restore PAKNET modem operation. Check that voltage on the modem power cable is present (see section 5.2.2 on page 71). If no voltage present, replace the processor card.
Note: If communications cannot be established then power is only applied to the modem for approximately 5 seconds, before the software enters a retry delay sequence.</td></tr>
<tr><td>Modem Failure</td><td>If all the above checks have shown no problems then replace the modem.</td></tr>
</table>

8.4.4 TABLE FOR UTMC COMMUNICATIONS FAILURES

Note that use of the term ‘modem’ applies equally to DSL Modem modules

Symptom	Possible Diagnosis	Action to Check Diagnosis
(a) Unit will not communicate with the Instation	Telephone cable disconnected	Check the telephone connections to the modem and the Line connection socket. If modem is powered, and connections OK, replace the modem.
	Ethernet cable disconnected	Check the Ethernet cable connections between the modem and the processor card. If modem is powered, and connections OK, replace the modem.
	Modem failed	Check if the modem’s ‘‘ON” LED is lit (see appropriate modem section), if yes replace modem. If no check that the modem is powered and voltage on the modem power cable is present.
	Unit out of service	Check that the statuses of the LEDs on the Processor board are correct (see section 7.3 which starts on page 118). If not, power down and power up the unit. If fault persists, replace the processor board.
	Unit power failed	Check that the mains input to the unit is present. If yes, replace the unit’s PSU. If no, then check the mains supply and fuses.
	Modem incompatible with Instation modem	Check that the unit and Instation are using compatibly configured modems. Refer to section 8.4.4.

8.4.5 Modem Compatibility

GEMINI^2 Firmware	Outstation Modem	RMS Instation Pace PMC33.6 or Lasat 288: forced V21 (300baud)	RMS Instation Pace PMC33.6 or Lasat 288: auto baud	RMS Instation Dynalink PKS-5600: forced V21 (300baud)	RMS Instation Dynalink PKS-5600: auto baud	Maximum Data Rate with auto baud Instation Modem
Any	Dynalink PKS-5600	OK	OK	OK	OK	19200 baud
Any	TC35 GSM	Not Compatible	OK	Not Compatible	OK	9600 baud

8.5 TABLE FOR EQUIPMENT FAILURES

Symptom	Possible Diagnosis	Action to Check Diagnosis
(a) Unit not operating	Software watchdog has triggered	Check the state of the Watchdog LED (see section 7.3 which starts on page 118), if lit power down and power up the unit to cause a reset. If Watchdog LED lights again, replace the processor board. If the Watchdog LED lights again, replace the unit.
	Processor board failed	Check the state of the System LED (see section 7.3 which starts on page 118), it should be flashing. If it is either permanently on or off power down and power up the unit to cause a reset. If the error condition persists replace the processor board. If the System LED lights again, replace the unit.
	Voltage Monitor Transformer failed (OMCU only)	Check using the Handset code FLT for fault LOF. If the fault exists and the lamps at the intersection are on, check using handset code KAC1 1 to display the reading from the Voltage Monitor Transformer. If the reading is 0 replace the Voltage Monitor Transformer. If the reading is above 0 replace the I/O board.
	Unit not configured	If the RUN LED is flashing quickly (see section 7.3 which starts on page 118) then the unit may not be configured. On an OMCU, use the handset command OPM to find out the operating mode (see page 250), while on a MOVA unit, check that the site data is still present by using the PC comms applications to display the site filenames. Reload the configuration / site data if necessary.
	Unit disabled	If the RUN LED is flashing quickly (see section 7.3 which starts on page 118) then the unit may be disabled, e.g. monitoring disabled in the case of an OMCU.
(continued overleaf)	Incorrect board addresses	Check the state of the LEDs and the handset output. If all LEDs are extinguished and no output is produced on the handset then it is likely that the unit cannot detect a power active signal from the first board. Check the board address switches (see section 5.2.1 which starts on page 70).

Symptom	Possible Diagnosis	Action to Check Diagnosis
(a) Unit not operating (continued)	Software not running	If the System LED is flashing and an error message is being continually output on the handset, this indicates that an internal check has repeatedly failed. Power down and power up the unit to cause a reset. If fault persists, replace the processor board and then whole unit.
	Expansion port failed	Check the Board address switches for all the I/O boards are set correctly, to select that I/O board relative to its position in the stack (see section 5.2.1 on page 70). If yes, replace the Processor board. If no, set the switches to the correct setting.
(b)Input and Output (I/O) board faults	Digital input failed	Monitor the relevant input(s) using the Handset code DIP (see section 13.4) or use the MOVA commissioning screen. If, the indications are incorrect, replace the relevant I/O cable and board. If, the indications are correct, replace the processor board. If the fault persists, replace the unit.
	Digital output failed	Monitor the relevant output(s) using the Handset codes SOB or SOP (see page 248) or use the MOVA commissioning screen. If the output does not function as displayed, replace the relevant I/O cable and board. If the fault persists, replace the unit.
	Green State inputs failed (OMCU only)	Monitor the relevant input(s) using the Handset code MSI (see section 13.4) for correct operation. If, the indications are incorrect, replace the relevant I/O board. If, the indications are correct, replace the processor board. If the fault persists, replace the unit.
(continued overleaf)	Voltage Monitor input failed (OMCU only)	Monitor the Voltage Monitor Transformer Analogue inputs using the Handset code KAC (see section 13.5), for correct operation. Observe the handset display and check that the varying reading is approximately between 650 to 800 for bright or 450 to 600 for dim (160V setting). If, the readings are incorrect, replace the relevant I/O board. If, the readings are correct, replace the processor board. If the fault persists, replace the unit.

Symptom	Possible Diagnosis	Action to Check Diagnosis
I/O board faults (continued)	Current sensor inputs failed (OMCU only)	Monitor the relevant input(s) using the Handset code KAC (see section 13.5), for correct operation. Observe the handset display and check that the varying reading is approximately 50 per bulb for bright or 40 per bulb for dim. If, the readings are incorrect, replace the relevant I/O board. If, the readings are correct, replace the processor board. If the fault persists, replace the OMCU.
	Unit not able to read the inputs and outputs on certain groups of ports belonging to an I/O board	Check that the address switches of suspected boards are set correctly (see section 5.2.1 on page 70). If OK, replace that I/O board. If not OK, set the switches to the correct setting.
(c) Handset port not operating	Terminal configured wrong	Check that the terminal is set correctly to act as a dumb terminal, at 1200, 9600, 19200 or 57600 baud, with 1 start bit, 7 data bits, 1 stop bit and even parity.
	Unit is 'Auto Bauding'	The software can operate the handset port at either 1200, 9600, 19200 or 57600 and thus 'auto-bauds' to determine the required speed. Therefore, it does not generate the initial 'SIEMENS' prompt until <return> is pressed a number of times.
	Wrong type of terminal	If the terminal can not be set to act as a dumb terminal, at 1200, 9600, 19200 or 57600 baud, with 1 start bit, 7 data bits, 1 stop bit and even parity, then replace the terminal. The terminal must use the RS232 DTR/DSR control lines.
	Handset port failed	Check the terminal is set correctly and that its interconnection cable is not damaged. If the handset port still does not work, replace the processor board.

8.6 TABLE FOR POWER FAILURES

Symptom	Possible Diagnosis	Action to Check Diagnosis
(a) Unit not operating	PSU failed	Check the unit has mains power. If yes, replace the PSU. If no, then check the cabinet's mains fusing and power supply.
	Mains Input failed	Check the cabinet's mains supply to the unit and repair as necessary. If fault still persists due to no mains, request the electricity authority to restore mains supply.
(b) Outstation has no Unit Battery Support.	Battery Fuse failed	Check the battery fuse on the front panel and replace if blown.
	Battery cable connections failed	Remove the unit. Check, by removing the protective cover from the PSU and battery area, that the Faston tags are connected correctly Refit if necessary.
	Unit Support Battery failed	When the Mains power is switched off, or has failed. If the battery fuse on the front panel is not blown, and the battery cables connections are sound, then replace the Unit's support battery (see section 8.2 on page 125).
(c) Unit has no Configuration or fault data support	RAM support battery insulation tab still fitted	Check that the RAM support battery insulation tab is not fitted. If fitted remove it and check if the unit now has RAM memory support. If the fault still persists, replace the RAM Battery (see section 8.2 on page 125).
	RAM support battery failed	If the RAM support battery insulation tab is not fitted replace the battery (see section 8.2 on page 125).

9. MOVA

9.1 MOVA Introduction

IMPORTANT: BEFORE LOADING ANY CONFIGURATION DATA, REFER TO SECTION 9.6.7 ON PAGE 156.

The following is an extract from the introduction of AG10.

> *MOVA stands for Microprocessor Optimised Vehicle Actuation, a new strategy for control of traffic light signals at isolated junctions – junctions uncoordinated with any neighbouring signals. MOVA is designed to cater for the full range of traffic conditions from very low flows through to a junction that is overloaded. For the major part of the range, before congestion occurs, MOVA operates in a delay minimising mode; if any approach becomes overloaded, the system switches to a capacity maximising procedure.*
>
> *The MOVA system requires vehicle detection by inductive loop or equivalent detectors that provide both vehicle counts and presence information. Each traffic lane approaching the junction has one or more detectors.*

This Handbook covers the installation, maintenance and commissioning steps for the Siemens MOVA unit. The current production version of MOVA is version 6, this handbook therefore describes the commissioning and operation in the context of MOVA 6. Where there are significant differences between MOVA 6 and previous versions they are detailed in Appendix D. The Gemini^2 platform is capable of running two MOVA streams simultaneously, for additional information on this option see section 9.8 of this chapter.

Also refer to the Highways Agency Installation Guide for MOVA (MCH 1542) and the TRL booklets AG10, AG11 and AG12. These documents complement this handbook by covering the design of MOVA intersections, such as determining the location of the vehicle loops and the construction of the MOVA site data, as well as commissioning the completed MOVA intersection.

The Siemens MOVA unit combines the TRL MOVA software and Siemens RMS OMCU on a single hardware platform.

The GEMINI^2 platform enables control of dual stream installations by a single OMCU. Operation in dual stream mode differs slightly from single stream, section 9.8 describes the differences.

The installation and maintenance of a Siemens MOVA unit is very similar to the installation and maintenance of the OMCU. Therefore…

see section 5 for the installation and section 7 for maintenance details.

However, commissioning a MOVA unit is very different from commissioning an OMCU or Bus Processor and thus this is covered later in this section.

The MOVA facility requires the use of an STC supplied licence code in order to be activated. See section 9.6.5, on page 154.

MOVA Version	Compatible Gemini Platform	Firmware Part Number
4	Gemini or Gemini^2	PB683
5 Single Stream	Gemini or Gemini^2	PB684
5 Dual Stream	Gemini^2	PB686
*6	Gemini^2	PB687

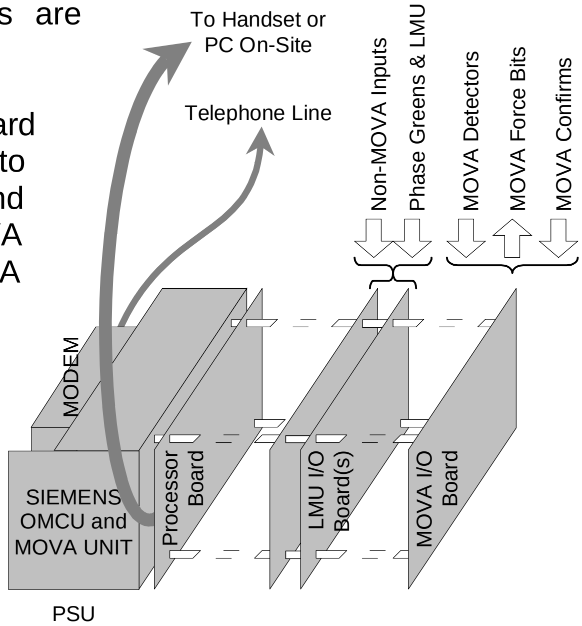
* MOVA 6 includes the dual stream option by default

The Siemens OMCU and MOVA Unit

Both the MOVA and OMCU applications are available within a single Outstation.

This unit is fitted with a processor board together with one or two LMU I/O boards to provide the OMCU with its detector and mains' state inputs, and one Bus / MOVA (Digital) I/O board to provide MOVA detectors, force and confirm bits.

Note: Most of these I/O boards will not be required if the enhanced serial link to ST800/700 option described in section 4.2.6 on page 44 and section 9.6.4 on page 153 is used.



Access to the MOVA application through the handset port:

(i) Access to the MOVA application is via a PC running suitable software connected to the 25 way D-Type port on the front of the processor board; see section 9.6.1 on page 151. The same software must also be used to communicate with the MOVA unit across the telephone line, see section 9.7 on page 163.

(ii) The MOVA application will not communicate with the small portable handsets commonly used to interrogate other traffic equipment as it uses full screen displays rather than simple handset commands.

9.2 MOVA Freestanding Interfaces

Since the MOVA unit uses the same hardware platform as the OMCU, the interfaces are similar to those of the OMCU and thus most are covered by section 5.6 which starts on page 80.

Maximum Capabilities for each MOVA Version (Single Stream)

	MOVA 4	MOVA 5	MOVA 6
Detector Inputs	32	64	64
Confirm Inputs	10	26	26
Controller Ready Inputs	1	1	1
Force Bit Outputs	8	10	10
Take Over Output	1	1	1

(Note that the table applies to both freestanding and integral options)

I/O Summary:

MOVA Connection		Connected to…
MOVA Detectors	⇦	Controller detectors (and ped. Outputs)
Confirm and Controller Ready Bits	⇦	Controller UTC terminal blocks (Outputs)
MOVA Force Bits (Fn and TO)	⇨	Controller UTC terminal blocks (Inputs)
PL1 & PL2 Input 0V	⇨	Controller detector ground connection

The digital inputs and outputs used by MOVA are pre-allocated since the MOVA site data is hardware platform independent. The MOVA application will automatically use the inputs and outputs of the BUS / MOVA (Digital) I/O boards that are fitted as follows:

Card 1 MOVA I/O CONNECTOR 2 (PL2 - TOP)

	MORE FORCE BITS (OUTPUTS)													CONFIRM INPUTS								MORE DETS				
49					F13	F13		F11	F11		F9	F9	0v			G10	G8	G6	G4	G2	CR	31	29	27	25	1
50	T0	T0					F12	F12		F10	F10		0v				G9	G7	G5	G3	G1	32	30	28	26	2

49		F7	F7		F5	F5		F3	F3		F1	F1	0v	23	21	19	17	15	13	11	9	7	5	3	1	1
50	F8	F8		F6	F6		F4	F4		F2	F2		0v	24	22	20	18	16	14	12	10	8	6	4	2	2
	FORCE BITS (OUTPUTS)												DETECTOR INPUTS													

Card 1 MOVA I/O CONNECTOR 1 (PL1 - BOTTOM)

Card 2 MOVA I/O CONNECTOR 2 (PL2 - TOP)

	(OUTPUTS)													CONFIRM INPUTS								MORE DETS				
49													0v	G25	G23	G21	G19	G17	G15	G13	G11	63	61	59	57	1
50													0v	G26	G24	G22	G20	G18	G16	G14	G12	64	62	60	58	2

49													0v	55	53	51	49	47	45	43	41	39	37	35	33	1
50													0v	56	54	52	50	48	46	44	42	40	38	36	34	2
	(OUTPUTS)												DETECTOR INPUTS													

Card 2 MOVA I/O CONNECTOR 1 (PL1 - BOTTOM)

The use of each detector input, each confirm bit input and each force bit output and their terminal positions should be recorded on a MOVA Installation Sheet. An example of a MOVA Installation Sheet is given on pages 334 and 336.

9.2.1 Detector Inputs and Push-Buttons

The detector inputs are normally connected in parallel to the controller at the controller's terminal blocks.

Important Ensure that the detector inputs have been configured in the correct sense in the MOVA site data. For example, on a Siemens T400 or ST800/700 controller, the detector inputs are normally open circuit, closing when a vehicle is detected.

Note:The OMCU can monitor the MOVA vehicle detector inputs on the MOVA I/O board. Therefore these detectors do not need to be wired into the OMCU's LMU I/O board(s) as well as the MOVA I/O board. See section 5.6.3 which starts on page 91.

It is recommended that Push button inputs be configured as follows…

The controller should be configured to provide an output for each pedestrian phase, which is then connected to the configured MOVA pedestrian detector input, rather than connecting the MOVA unit directly to the push-button input(s).

This output should be activated when the controller has a demand registered for that phase and thus are sometimes referred to as a 'wait confirms'. But note that they must be configured in the same sense as the detectors (e.g. normally open, closing when a demand has been latched), which may be in the opposite sense to the stage- and phase-confirm outputs.

9.2.2 Confirms and Controller Ready Inputs

The stage- and phase-confirm outputs from the controller should be configured as held closed, opening when the stage/phase is active. The Controller Ready Bit should be closed when the controller is ready.

Therefore, being physically normally open contacts, if the controller fails, then the MOVA unit will see the controller ready bit disappear and multiple stage confirms, and thus it will release control of the junction.

9.2.3 Force Bits and Take Over Outputs

When the MOVA unit is on control, it closes the 'Take Over' relay output and closes the required stage force bit relay output.

9.2.4 I/O Allocation

The standard cableform connects into these connectors and provides flying leads for each pin. Since there are two connectors on each BUS / MOVA (Digital) I/O board, PL1 and PL2, then each board requires two identical cables. It is therefore recommended that the cableforms be clearly identified before installation commences.

The wire colours used are described on the following page.

If more inputs are required, then a second BUS / MOVA (Digital) I/O board can be fitted, also shown on the following page. This increases the number of detector inputs by 32 and the number of confirm-inputs by 16. See table above for details.

An alternative cableform is available which simplifies connecting the MOVA unit up to a Siemens T400 traffic controller and this is described on page 146.

9.2.4.1 MOVA Digital I/O Connections

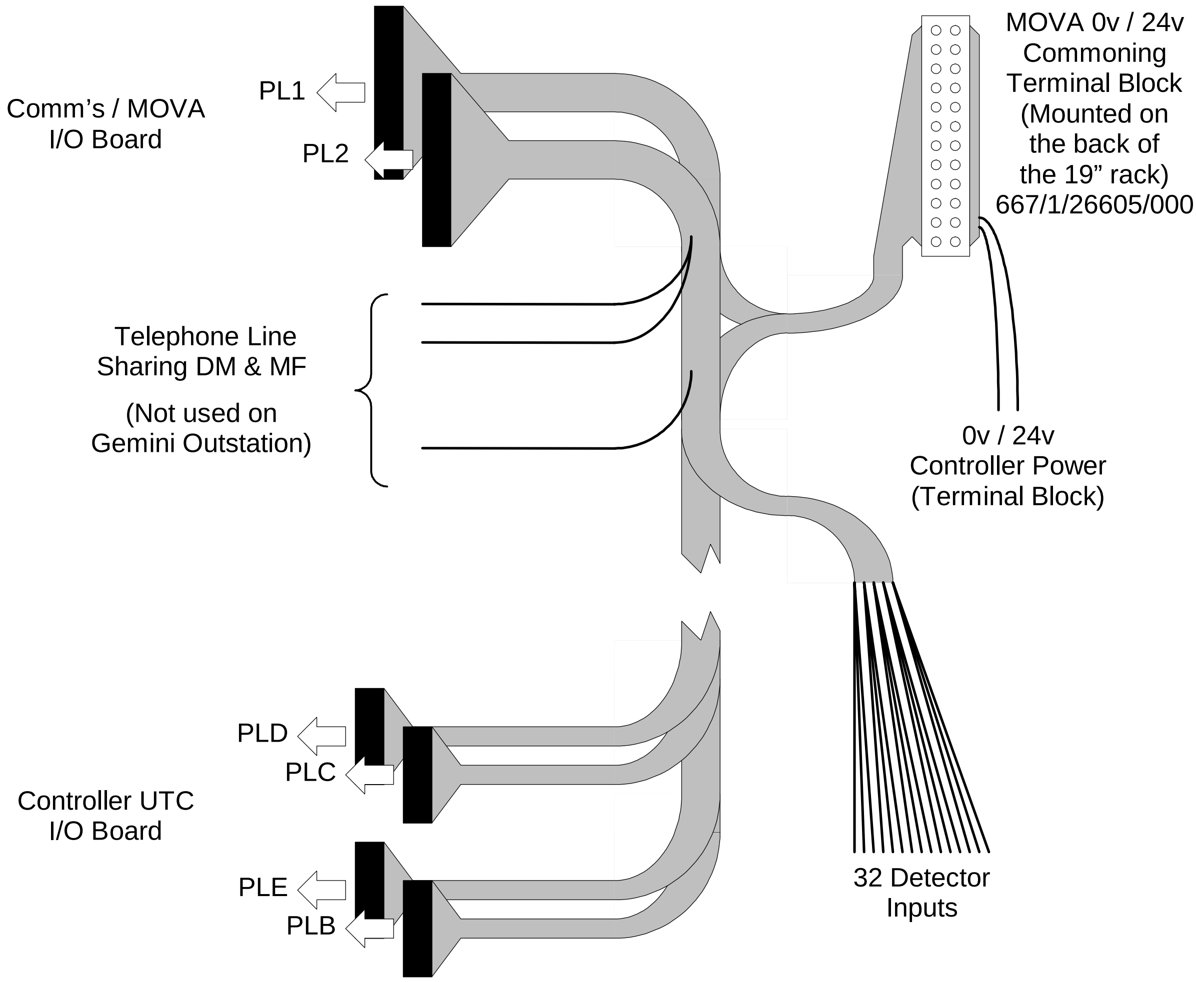
Pin	Wire Colour	Board 1 PL1	Board 1 PL2	Board 2 PL1	Board 2 PL2
1	Blue	Detector 1	Detector 25	Detector 33	Detector 57
2	Yellow	Detector 2	Detector 26	Detector 34	Detector 58
3	Brown	Detector 3	Detector 27	Detector 35	Detector 59
4	Violet	Detector 4	Detector 28	Detector 36	Detector 60
5	Orange	Detector 5	Detector 29	Detector 37	Detector 61
6	Slate	Detector 6	Detector 30	Detector 38	Detector 62
7	Pink	Detector 7	Detector 31	Detector 39	Detector 63
8	Red / Blue	Detector 8	Detector 32	Detector 40	Detector 64
9	Red / Green	Detector 9	Controller Ready	Detector 41	Confirm Bit 11
10	Red / White	Detector 10	Confirm Bit 1	Detector 42	Confirm Bit 12
11	Red / Brown	Detector 11	Confirm Bit 2	Detector 43	Confirm Bit 13
12	Red / Orange	Detector 12	Confirm Bit 3	Detector 44	Confirm Bit 14
13	Red / Slate	Detector 13	Confirm Bit 4	Detector 45	Confirm Bit 15
14	Blue / Green	Detector 14	Confirm Bit 5	Detector 46	Confirm Bit 16
15	Blue / White	Detector 15	Confirm Bit 6	Detector 47	Confirm Bit 17
16	Blue / Brown	Detector 16	Confirm Bit 7	Detector 48	Confirm Bit 18
17	Blue / Orange	Detector 17	Confirm Bit 8	Detector 49	Confirm Bit 19
18	Blue / Slate	Detector 18	Confirm Bit 9	Detector 50	Confirm Bit 20
19	Green / Orange	Detector 19	Confirm Bit 10	Detector 51	Confirm Bit 21
20	Green / Brown	Detector 20	(DM)	Detector 52	(Confirm Bit 22)
21	Green / Slate	Detector 21	Do Not Use	Detector 53	(Confirm Bit 23)
22	Brown / Slate	Detector 22	Do Not Use	Detector 54	(Confirm Bit 24)
23	Orange / Brown	Detector 23	Do Not Use	Detector 55	(Confirm Bit 25)
24	Orange / Slate	Detector 24	Do Not Use	Detector 56	(Confirm Bit 26)
25	White	Input 0V	Input 0V	Input 0V	Input 0V
26	White	Input 0V	Input 0V	Input 0V	Input 0V
27	Blue	F1 n/open	F9 n/open		
28	Yellow	-	-		
29	Brown	F1 common	F9 common		
30	Violet	F2 n/open	F10 n/open		
31	Orange	-	-		
32	Slate	F2 common	F10 common		
33	Pink	F3 n/open	F11 n/open		
34	Red / Blue	-	-		
35	Red / Green	F3 common	F11 common		
36	Red / White	F4 n/open	F12 n/open		
37	Red / Brown	-	-		
38	Red / Orange	F4 common	F12 common	Outputs on Second Board are not used by MOVA	Outputs on Second Board are not used by MOVA
39	Red / Slate	F5 n/open	F13 n/open		
40	Blue / Green	-	-		
41	Blue / White	F5 common	F13 common		
42	Blue / Brown	F6 n/open	(MF n/open)		
43	Blue / Orange	-	-		
44	Blue / Slate	F6 common	(MF common)		
45	Green / Orange	F7 n/open			
46	Green / Brown	-	(SP)		
47	Green / Slate	F7 common			
48	Brown / Slate	F8 n/open	TO n/open		
49	Orange / Brown	-	-		
50	Orange / Slate	F8 common	TO common		

9.3 Connection to a Siemens T400

To simplify connecting the MOVA unit to a Siemens Type 400 traffic controller, an alternative cableform is available.

This cableform connects the first BUS / MOVA (Digital) I/O Board's connectors PL1 and PL2 directly to the controller's UTC Expansion I/O Board's four connectors PLB, PLC, PLD and PLE. This cable also commons the 24V and 0V connections and thus only requires two wires to be connected to the controller's 24V and 0V supplies.

It cannot however replace the detector cables and these still have to be connected during installation. Note that the colours of these wires are the same as the colours used in the standard cableform that is detailed on the previous page.



I/O Cable between Siemens MOVA and a T400 - 667/1/26604/000

9.4 Telephone Line Sharing

The GEMINI Traffic Outstation does not use this facility.

9.5 MOVA Commissioning Checklist

The following checklist should be used to commission a Siemens MOVA unit. The steps are expanded upon in section 9.6, which starts on page 150.

If an OMCU and MOVA unit is being installed, it is recommended that the OMCU application be commissioned before the MOVA application. The checklist should be followed in sequence:

Step	Section	Action to be Performed
1)	5	Check that the MOVA unit has been installed correctly.
2)	6	Check that the OMCU has been commissioned correctly (when an OMCU and MOVA unit is being installed).
3)	5.2.8	Ensure the RAM backup battery insulation strip has been removed.
4)	9.6.7	All the cables can be connected since the unit can now be re-initialised **after** the correct site data has been loaded to ensure a ‘clean start’.
5)	-	Switch on the MOVA unit’s mains supply.
6)	7.3.1	Check that the System LED (LP1) is flashing. Note that MOVA will flash this LED at the fast rate since the unit is not ‘On Control’.
7)	9.6.1	Connect the PC to the MOVA unit’s local port (the 25 way D-type connector on the front of the processor board) and start the MOVA communications application.
8)	9.6.2	Initialise MOVA by entering the handset command INI=2. If the OMCU application is not required, enter INI=3 to completely re-initialise the whole unit. Enter LDV=7 to request the MOVA facility. Refer to section 9.8 if running dual stream MOVA Refer to Appendix D for MOVA 4
9)		Step deleted

Step	Section	Action to be Performed
10)	9.6.4	If MOVA is to use a Bus / MOVA (Digital) I/O Board, check that the SOP handset command shows the correct type of I/O boards have been detected, see page 248. If MOVA is to use the enhanced serial link to an ST800/700 but the OMCU has not been configured, enable the facility manually using ‘`MIO=2`’ and check that the enhanced serial link is active, i.e. ‘`EEL:3`’.
11)	9.6.5	Enter the correct MOVA licence codes, e.g. ‘`LIN=1234 5678 and LIF=123ABC`’.
12)	9.6.6	Set the time and date in the MOVA unit.
13)	9.6.7	Download the site data into the MOVA unit from the PC and then clear the MOVA working data as instructed on the screen.
14)	9.6.8	Use the commissioning screen to check for following. a) MOVA is currently not enabled (MOVA enabled = 0) b) The Controller is ready* (CRB = 1) c) The Confirm bits are all set to ‘1’, except for the current stage which should be set to ‘0’. Watch the controller perform at least one complete cycle to check that each stage and phase confirm bit is being activated correctly by the controller. * It may be necessary to press the ‘Normal’ button on the controller’s manual panel before it will activate the ‘Controller Ready Bit’.
15)	9.6.8	Also use the commissioning screen to check the operation of each detector is correct. The detector display normally shows ‘0’, turning to a ‘1’ when a vehicle passes over the loop (or the controller has latched a pedestrian demand). Also check that vehicles in adjacent lanes do not activate the loop.
16)	9.6.8	**<u>Important:</u>** The following causes the MOVA unit to take control of the Intersection and care should be taken to avoid undue disruption to traffic flows. Still using the commissioning screen, force each stage in turn and check that the controller moves to the required stage and that the correct stage / phase confirm bits are activated.
17)	9.6.9	Check that the Error Log contains no unexpected entries and then clear the error log.

<table>
<tr><th>Step</th><th>Section</th><th>Action to be Performed</th></tr>
<tr><td>18)</td><td>9.6.10</td><td>Again using the commissioning screen, put the MOVA unit on control:
a) Set the 'MOVA enable' flag to '1' *
b) Close communications ('FI' from the menu)
c) Switch the MOVA unit's power off and back on
d) Return to the commissioning screen
Check that as the controller changes from stage to stage that the 'Warm-up Count' increments.
* MOVA cannot be enabled if the licence number is invalid (9.6.5).</td></tr>
<tr><td>19)</td><td>9.6.10</td><td>When this count reaches the number of stages plus one (e.g. 6 on a 5-stage controller) the MOVA unit will put itself on control. Check :
a) The 'On Control' flag changes from '0' to '1'.
b) The 'TO' bit changes from '0' to '1'.
c) The MOVA unit demands the current (or next) stage.
d) The 'Error Count' remains at zero.</td></tr>
<tr><td>20)</td><td>9.6.10</td><td>Examine the operation of the controller under MOVA control to ensure that reasonable operation is achieved, e.g. no demands are been ignored and no excessive queues build-up, and that no faults have been generated and the error count remains at zero.</td></tr>
<tr><td>21)</td><td>9.6.11</td><td>Telephone Options
The MOVA unit can be installed with various telephone line options:
a) In an OMCU and MOVA unit, the OMCU application is always responsible for dialling the RMS Instation. This would have been checked during the OMCU commissioning sequence.
b) The MOVA unit can also function without a telephone line.
For option a), the telephone line should have already been checked as part of commissioning the OMCU. Therefore, no additional telephone tests are required for MOVA.</td></tr>
<tr><td>22)</td><td>9.6.12</td><td>This completes the commissioning steps. The MOVA unit can, depending on the client's instructions and the validity of the data, be left operational.
Note that for highly critical junctions where the loss of a detector without the historical flow data could result in serious complications, it may be necessary to leave the MOVA disabled for one week with the controller running in its fall-back mode. When the unit has built-up this back-up data, the unit can be enabled. Note that the unit can be enabled remotely if a telephone line is fitted.</td></tr>
</table>

Siemens MOVA Commissioning Complete

9.6 MOVA Commissioning Detail

This section expands on the steps in the commissioning checklist from the previous section…

If an OMCU and MOVA unit is being installed, it is recommended that the OMCU application be commissioned before the MOVA application. The checklist should be followed in sequence:

Step	Section	Action to be Performed
1)	5	Check that the MOVA unit has been installed correctly.
2)	6	Check that the OMCU has been commissioned correctly (when an OMCU and MOVA unit is being installed).
3)	5.2.8	Ensure the RAM backup battery insulation strip has been removed.
4)	9.6.7	All the cables can be connected since the unit can now be re-initialised **after** the correct site data has been loaded to ensure a 'clean start'.
5)	-	Switch on the MOVA unit's mains supply.
6)	7.3.1	Check that the System LED (LP1) is flashing. Note that MOVA will flash this LED at the fast rate since the unit is not 'On Control'.

9.6.1 Communicating Locally with the MOVA Unit

7)	9.6.1	Connect the PC to the MOVA unit's local port (the 25 way D-type connector on the front of the processor board) and start the MOVA communications application.

Connect a normal controller handset cable (such as the IPT cable 667/1/17523/003) from the PC to the 25 way port on the front of the MOVA unit. Also see Section 3.10.6.

Start the MOVA Communications program, which can be downloaded from the TRL website. The program will ask which PC COM port the serial cable is connected to.

It will then ask whether the MOVA unit is connected locally or remotely via a modem. Select local communications and then press 'Return' until the unit responds.

If nothing is displayed, check that the cable has been connected to the correct serial COM port and that no other applications on the PC are using the same serial port.

Connection is initially to the OMCU handset application. To connect through to the MOVA application, simply enter '`MOVA`' (or '`XXM`').

Before the MOVA unit displays its main menu, it may display its current time and date. If necessary, correct this using section 9.6.6 on page 155.

NB: If the Instation is communicating remotely with the MOVA unit, then access to MOVA on site will be refused until the call is complete. Likewise, while an engineer on site is connected to MOVA, remote communications from the Instation to MOVA are refused. The Instation will have to try again later.

When '`FI`' (Finish) is entered from the MOVA menu, the connection will return to the OMCU handset application. The serial cable can now be safely disconnected from the front of the MOVA unit and pressing F10 can close the MOVA Communications application.

9.6.2 Complete Initialisation

8)	9.6.2	Initialise MOVA by entering the handset command INI=2. If the OMCU application is not required, enter INI=3 to completely re-initialise the whole unit. Enter LDV=7 to request the MOVA facility. Refer to section 9.8 if running dual stream MOVA Refer to Appendix D for MOVA 4

Initialisation is requested using the INI handset command:

Firmware	Command	OMCU Initialised	MOVA Initialised	Complete Initialisation
PB684	INI=1	✓	-	-
PB684	INI=2	-	✓	-
PB684	INI=3	✓	✓	✓
PB686	INI=1	✓	-	-
PB686	INI=2	-	✓	-
PB686	INI=3	✓	✓	✓

Complete initialisation effectively forces the ‘first time power-up condition’ by clearing the entire RAM within the unit. It is recommended that ‘INI=3’ is entered when a new unit is first installed to ensure that all data has been initialised. In addition to clearing the working data of the OMCU and the MOVA applications like INI=1 and INI=2 respectively, INI=3 also clears additional items which are not cleared by INI=1 and INI=2. This includes the handset command MIO (section 9.6.4), the MOVA licence number (section 9.6.5), the real time clock (section 9.6.6), and the MOVA site data stores (section 9.6.7).

The LDV=7 command is required in order to enable the MOVA software

9.6.3 Phone Line Sharing Facility (PLS)

9)		Step deleted

‘Phone Line Sharing’ with a separate outstation unit is not provided by the GEMINI Outstation.

9.6.4 Serial Link between MOVA and an ST800/700 (MIO)

10)	9.6.4	If MOVA is to use a Bus / MOVA (Digital) I/O Board, check that the SOP handset command shows the correct type of I/O boards have been detected, see page 248. If MOVA is to use the enhanced serial link to an ST800/700 but the OMCU has not been configured, enable the facility manually using 'MIO=2' and check that the enhanced serial link is active, i.e. 'EEL:3'.

The Outstation has the option of using an enhanced serial link to an ST800/700 traffic controller to monitor the traffic controller. Through this link the OMCU receives information such as the detector and green states to provide a more integrated traffic product and to remove the need for almost all of the Outstation's external wiring.

This enhanced serial link can also be used by MOVA in the OMCU and MOVA unit. Over this link MOVA obtains the states of all of its detectors and the stage/phase confirms from the ST800/700 traffic controller and passes back the required force bits. Note that the ST800/700 traffic controller must be configured to use 'Serial MOVA' for this facility to function. See section 4.2.6 on page 44 for more details.

The unit will automatically attempt to determine whether MOVA should use its Bus / MOVA (Digital) I/O Board or the enhanced serial link after complete initialisation, i.e. INI=3 or first time power-up, as follows:

If one or more Bus / MOVA (Digital) I/O boards are fitted, then MOVA will initially attempt to use the first Bus / MOVA (Digital) I/O board fitted ("MIO:1").

If only LMU I/O boards are fitted and no Bus / MOVA (Digital) I/O boards, then MOVA will initially not attempt to read any inputs or set any outputs ("MIO:0"). If the OMCU is subsequently configured by the Instation to use the enhanced serial link, then MOVA will also automatically attempt to use the enhanced 141 link ("MIO:2").

Regardless of what the unit decides, MOVA can be manually configured to use the first Bus / MOVA (Digital) I/O board by entering "MIO=1" or to use the enhanced serial link by entering "MIO=2".

Important **If MOVA is required to use a Bus / MOVA (Digital) I/O board, always use the handset command SOP to check that the correct I/O boards have been detected by the firmware (see page 248). However, if MOVA is required to use the enhanced serial link, then check for 'EEL:3' (section 13.8) and check that the controller firmware supports, and is configured to use serial MOVA (section 4.2.6). The fault 'MSF – MOVA Serial Fault' will be raised if MOVA cannot communicate over the link (see section 13.6.2 on page 226 for more details on the OMCU/RMS fault log).**

9.6.5 MOVA Licence Codes

11)	9.6.5	Enter the correct MOVA licence codes, e.g. 'LIN=1234 5678 and LIF=123ABC'.

The software licence codes are supplied from Poole and before this can be done the Serial Number of the Outstation Processor must be obtained. This can be found by either looking on the card itself or using the Handset code HIC.

Determine whether the site is to be installed with MOVA 4, MOVA 5 or MOVA 6.

- **MOVA 6** requires firmware **PB686** from issue 6 onwards

- **MOVA 5** requires firmware **PB686** to issue 5
  NB: This was PB684 on the original Gemini platform)

- **MOVA 4** requires firmware **PB683**
  MOVA 4 should only be used where compatibility is required with an existing MOVA 4 site. **MOVA 4 is not recommended for new installations.**

Poole will then supply two numbers:

1. One represents the code;
2. The other represents the facilities enabled.

The 'code' is then entered into the Outstation using the following command:

LIN=xxxx xxxx <CR> where xxxx xxxx represents the unique 'code number' for the site.

The 'facility' is then entered into the Outstation using the following command:

LIF=yyyyyyyy <CR> where yyyyyyyy represents the 'facilities' available on the site.

In cases of emergency when it is not possible to contact Poole for licence codes the following 'Emergency Code' can be used

LIN=9999 9999 <CR>

This will enable all facilities for a period of 7 days.

Once a licence number has been issued for the unit, it should be written down on the MOVA Installation sheet for the unit and kept in the controller cabinet.

9.6.6 Setting the Time and Date (CT)

12)	9.6.6	Set the time and date in the MOVA unit.

The unit may display its current time and date before displaying its main menu when connection is first established with the MOVA unit, particularly after a mains power failure or after being initialised. Alternatively, enter 'CT' from the MOVA main menu to check the unit's current time and date, or use the OMCU TOD command.

```
Time is 28/ 5/03 15:32:28
Do you want to change times <Y or N> ?
```

Typing 'Y' then 'Return' will allow the time and date to be changed. Any other character (or 'Return' on its own) will be taken as 'No'.

The time and the date must both be entered as 6-digit numbers, with a leading zero for values in the range 1 to 9 and without any separators. For example:

```
Enter time [HrMnSc] 093700
Enter date [DyMoYr] 010603
```

Note that the new time is only accepted when the 'Return' key is pressed to enter the date. Therefore the time entered should be 10 or 20 seconds ahead to allow time for the date to be entered and then 'Return' can be pressed at the correct time.

After the new date and time have been entered, the current time is displayed again so that it can be checked that it has been accepted correctly.

After the date and time, the summertime adjustment days in March and October can be changed. Again, the values must be entered with a leading zero for dates in the range 1 to 9.

```
Do you want to enter British Summer Time days <Y or N> y
Enter DAY in MARCH {2 digits – eg 01}, COMMA, DAY in OCTOBER [eg 25,28]
```

Tip! The unit's clock can also be viewed and changed using the OMCU handset command 'TOD', see page 249.

9.6.7 Download New Site Data (RS, LD, CN and DS)

13)	9.6.7	Download the site data into the MOVA unit from the PC and then clear the MOVA working data as instructed on the screen.

Caution: If the new site data contains a different number of links, lanes or stages, or different time-of-day data then MOVA must be re-initialised. Only if the configuration is the same as the configuration currently running in the MOVA unit (except for minor changes to timing values), can the new site data be downloaded without initialising the unit.

Site data is not compatible between different versions of MOVA. The appropriate TRL version of MOVA Setup will convert between the differing formats, eg. MOVA Setup M6.0 will convert MOVA 5 data sets to MOVA 6.

MOVA Site Data Loading

New site data can be downloaded into the MOVA unit using the ‘Data Set’ option – ‘DS’ from the MOVA main menu, followed by the ‘R’ command.

The command is password protected to prevent unauthorised changes to the site data and can only be attempted locally. The password is case sensitive and is defaulted to ‘AVOMGO’.

Up to four ‘plans’ can be loaded into the MOVA unit’s memory. Normally, only plan 1 will be used. However, it is possible to configure the MOVA unit to switch between the plans at different times of day. Hence up to four plans, numbered 1 to 4, may have to be downloaded.

The MOVA site data file name is usually suffixed by the ‘.MDS’ extension.

When the download of a plan is complete, the MOVA unit enters a dialogue sequence, typically:-

```
Download finished

   File name: . . . . . . NEWPARLEY.MDS
   Version: . . . . . . . M6.0
   Creation time & date:   9:45 29/10/ 4
   Title: . . . . . . . . NEW PARLEY WITH LANE TEN
   Stage/links/lanes: . .  5 /14 /10


Enter repository plan number to place this download data:
 1,2,3 or 4, (or 99 to reject this download)

1

Plan number 1 selected

Area 1 is empty. To confirm that you want to place
the downloaded dataset in this area, select 'Y'.
Else, select 'N' to place the dataset in a different area.
Do you want to place the dataset in this area? (Y/N)
Y
This plan has been placed in repository area 1
and will be loaded as active data


          Filename  St/Lk/Ln
A     HUGEMOVA.MDS  10/24/20
1     NEWPARLEY.MDS  5/14/10

Press <ENTER> to Continue

 The MOVA unit will now reboot in order to clear all of its working data, load
 the new site data and begin monitoring the intersection.
 Note: MOVA will be initially disabled. Use the "Look" screen to put MOVA back
       on-control after a warm-up cycle.

 Press [Return] to reconnect to the unit after it reboots...
```

Checking the Site Data

When new site data has been loaded, check it by displaying the site data using the ‘L’, ‘T’ and ‘D’ options.

If more than one plan has been downloaded, the ‘L’ option allows one of the plans to be loaded into the working area. The ‘T’ option shows the names of the plans loaded into each of the three backup stores and the name of the plan that currently resides in the working area. If there are no time of day changes, i.e. only one plan has been loaded then the MOVA unit will automatically load that plan into its working area.

The ‘D’ option displays all the site data of the plan currently residing in the working area. The MOVA unit pauses after each section, so that the data does not scroll off the top of the screen.

9.6.8 Commissioning Screen (LOOK)

14)	9.6.8	Use the commissioning screen to check for following. a) MOVA is currently not enabled (MOVA enabled = 0) b) The Controller is ready* (CRB = 1) c) The Confirm bits are all set to ‘1’, except for the current stage which should be set to ‘0’. Watch the controller perform at least one complete cycle to check that each stage and phase confirm bit is being activated correctly by the controller. * It may be necessary to press the ‘Normal’ button on the controller’s manual panel before it will activate the ‘Controller Ready Bit’.
15)	9.6.8	Also use the commissioning screen to check the operation of each detector is correct. The detector display normally shows ‘0’, turning to a ‘1’ when a vehicle passes over the loop (or the controller has latched a pedestrian demand). Also check that vehicles in adjacent lanes do not activate the loop.

The commissioning screen is used extensively to check the operation of the detectors, the force bits and the confirm bits. To display the commissioning screen, type ‘LOOK’ from the MOVA Main Menu.

Typical MOVA 6 Comissioning Screen

```
                         SIEMENS MOVA COMMISSIONING SCREEN
Detectors:        1  2  3  4    5  6  7  8    9 10 11 12   13 14 15 16
                 17 18 19 20   21 22 23 24   25 26 27 28   29 30 31 32
                 33 34 35 36   37 38 39 40   41 42 43 44   45 46 47 48
                 49 50 51 52   53 54 55 56   57 58 59 60   61 62 63 64

Confirms:         1  2  3  4    5  6  7  8    9 10 11 12   13 14 15 16
    CRB          17 18 19 20   21 22 23 24   25 26 27 28   29 30 31

Force Bits:           HI/TO     1  2  3  4    5  6  7  8    9 10


 MOVA enabled. . 1  Warmup. . . . . 6  Multi stage . . 0  On control. . . 1
         Demanded stage . . . 1  Watchdog . . . 9  Error count . . . 0

                        MOVA COMMISSIONING SCREEN OPTIONS
Press:   M  to enabled or disable MOVA;     C  to set MOVA on or off control;
         R  to refresh the whole screen;    X  to exit Commissioning Screen;
         Z  to zero the error count;
         1,2,3,... to force a stage (or 0 to cancel current force);

Press a Key:
       --- Press a key listed above  or  Press <Space> for Main Menu ---
```

The top of the screen shows the live state of all the detector inputs, followed by the **Controller Ready Bit (CRB)** and confirm bit inputs from the controller, and the force bits that the MOVA unit is currently outputting. The **‘MOVA enabled’** and **‘On Control’** flags and the **'Warm-up'** and **'Error counts'** are described in more detail in section 9.6.10.

For inputs on the Bus MOVA (Digital) I/O card, black background = input open circuit, red background = input short circuit.

For semi-integral MOVA, the input sense can be inverted or not, dependant on the controller configuration.

The **'Multistage'** flag is set to '1' if the confirm inputs indicate more than one stage is active, e.g. when the controller has failed or the I/O cables have been disconnected from the back of the MOVA unit.

The **'Demanded stage'** entry shows the stage that MOVA is currently demanding, or would try to demand if it was on control.

The **'Watchdog'** count should normally increment every half a second and remain in the range 0 to 20. It is used internally by the MOVA software to ensure that the various MOVA sub-systems are functioning correctly.

While the commissioning screen is active (and the description of these keys is being displayed), the state of the **'MOVA enabled'** flag and the **'On Control'** flag can be toggled by simply pressing 'M' or 'C' respectively. Similarly, the **'Error Count'** can be cleared back to zero by simply pressing 'Z'.

16)	9.6.8	**Important:** The following causes the MOVA unit to take control of the Intersection and care should be taken to avoid undue disruption to traffic flows. Still using the commissioning screen, force each stage in turn and check that the controller moves to the required stage and that the correct stage / phase confirm bits are activated.

(Remember to press <SPACE> to display the 'Screen Keys' before attempting to use any of the 'single key' commissioning screen commands)

To test the force bits and the confirms from the controller, the MOVA unit should first be switched off-line, i.e. if the **'MOVA Enabled'** flag is set to '1', press 'M'.

To force a stage simply press the number of the required stage, e.g. press '1' for stage 1 and then press '2' when stage 2 is required.

The MOVA unit will keep forcing the selected stage for about one minute after the key is pressed. To end the test, press '0'.

Pressing 'X' will exit the commissioning screen and the MOVA Main Menu will be displayed.

Pressing the space bar toggles between the single key press commands and the MOVA Main Menu:

Typical MOVA 6 Main Menu Screen

```
                         SIEMENS MOVA COMMISSIONING SCREEN
Detectors:        1  2  3  4    5  6  7  8    9 10 11 12   13 14 15 16
                 17 18 19 20   21 22 23 24   25 26 27 28   29 30 31 32
                 33 34 35 36   37 38 39 40   41 42 43 44   45 46 47 48
                 49 50 51 52   53 54 55 56   57 58 59 60   61 62 63 64

Confirms:         1  2  3  4    5  6  7  8    9 10 11 12   13 14 15 16
    CRB          17 18 19 20   21 22 23 24   25 26 27 28   29 30 31

Force Bits:           HI/TO     1  2  3  4    5  6  7  8    9 10


 MOVA enabled. . 1  Warmup. . . . . 6  Multi stage . . 0  On control. . . 1
        Demanded stage . . . 1  Watchdog . . . 9  Error count . . . 0

                             SIEMENS MOVA MAIN MENU
DS - DataSet menu        VM - View MOVA Messages        DF - Display Flows
     for operations:     DE - Display Error log         CF - Clear Flows
     Display, Load       CE - Clear Error log           LF - Look at/set Flags
     Download, Upload    DA - Display Assessment log    CT - Check/set Time
                         CA - Clear Assessment log      FI - FInish

Press a Key:
       --- Press a key listed above  or  Press <Space> for Main Menu ---
```

While the MOVA Main Menu is being displayed, enter the two-letter menu option required and press ‘Return’. When the required option completes, the main screen will automatically re-appear.

9.6.9 The Error Log (DE and CE)

17)	9.6.9	Check that the Error Log contains no unexpected entries and then clear the error log.

To display the error log, enter ‘DE’ from the main menu,

This displays timestamped reports of any warnings or errors detected by the MOVA unit. This log may help diagnose the reason why the MOVA unit has gone off control for example.

At the end of the log, the MOVA unit will display some debug information that can normally be ignored:

```
 CRASH(1-4)=         0         0         0         0
 TERM=   0 RCV(2)=   0 ABO=       0
```

To clear the error log, enter ‘CE’ from the main menu.

It is recommended that the error log be cleared after each site visit if all entries can be explained and the unit is functioning normally. Then the engineer making the next visit to site will only see faults that have occurred since the last visit.

9.6.10 Enabling MOVA Control

18)	9.6.10	Again using the commissioning screen, put the MOVA unit on control: a) Set the 'MOVA enable' flag to '1' * b) Close communications ('FI' from the menu) c) Switch the MOVA unit's power off and back on d) Return to the commissioning screen Check that as the controller changes from stage to stage that the 'Warm-up Count' increments. * MOVA cannot be enabled if the licence number is invalid (9.6.5).
19)	9.6.10	When this count reaches the number of stages plus one (e.g. 6 on a 5-stage controller) the MOVA unit will put itself on control. Check : a) The 'On Control' flag changes from '0' to '1'. b) The 'TO' bit changes from '0' to '1'. c) The MOVA unit demands the current (or next) stage. d) The 'Error Count' remains at zero.
20)	9.6.10	Examine the operation of the controller under MOVA control to ensure that reasonable operation is achieved, e.g. no demands are been ignored and no excessive queues build-up, and that no faults have been generated and the error count remains at zero.

This section describes in the more detail the '**MOVA Enabled'** and **'On Control'** flags and their interaction with the **'Error Count'** count and the **'Warm-up'** count.

Both flags must be set to '1' before MOVA will attempt to control the junction. If either flag is set to '0', then MOVA will not attempt to control the junction at that time, but may still be monitoring the traffic flows over its detectors.

The '**MOVA Enabled'** flag is normally only changed by the user, not by the MOVA unit itself. It is this flag which must be set to '1' by the user to allow the MOVA unit to take control of the junction and should be set to '0' to disable the MOVA unit for a long period of time.

Note that the OMCU will log the fault MOF 'MOVA Off' (see section 13.6) and report 'MOVA Disabled' to the RMS Instation when MOVA is disabled, i.e. when the '**MOVA Enabled'** flag is set to 0.

The '**On Control'** flag is normally only changed by the MOVA unit itself, although the user can change its state manually. If the '**MOVA Enabled'** flag is set, then following the warm-up cycle, the MOVA unit will set the **'On Control'** flag and start to control the junction.

During the warm-up cycle, the MOVA unit will increment the warm-up count on the commissioning screen every time a new stage starts. When this count reaches the number of stages plus one (e.g. 6 on a 5-stage junction) then the warm-up cycle is said to be complete. This warm-up cycle allows the MOVA unit to gather information about the junction before it takes control.

Following various fault conditions, the MOVA may put itself off control by clearing the '**On Control'** flag and incrementing its **'Error Count'**. Depending on the nature of the fault, the MOVA unit will increment the **'Error Count'** by one, two or five.

Every hour on the hour the MOVA unit decrements the '**Error Count'** unless it has reached the value of 20 when the unit will reset the '**MOVA Enabled'** flag back to 0.

9.6.11 Modem Commissioning

21)	9.6.11	**Telephone Options** The MOVA unit can be installed with various telephone line options: a) In an OMCU and MOVA unit, the OMCU application is always responsible for dialling the RMS Instation. This would have been checked during the OMCU commissioning sequence. b) The MOVA unit can also function without a telephone line. For option a), the telephone line should have already been checked as part of commissioning the OMCU. Therefore, no additional telephone tests are required for MOVA.

For more information on communicating remotely with the MOVA, see section 9.7.1 which starts on page 163.

9.6.12 Completing MOVA Commissioning

To close communications with the MOVA unit, type '`FI`' at the main menu. This will allow the MOVA unit to tidy-up and close the communications. The serial cable can now be safely disconnected from the front of the MOVA unit and pressing F10 can close the MOVA Communications application.

9.7 MOVA Communications Notes

Assistance on communicating locally with the MOVA unit during commissioning is provided in the previous section within the appropriate steps in the commissioning checklist, e.g. section 9.6.1 on page 151.

This section provides information on communicating remotely with a Siemens MOVA unit via the telephone network and describes some of the options, which may be useful once MOVA is functioning normally.

It does not cover all the aspects of communicating with a MOVA unit as these are covered in the TRL documentation, see section 1.3. It is primarily concerned with how to perform the tasks required to install, commission and maintain the Siemens MOVA unit and how it differs from the other MOVA units on the market.

9.7.1 Communicating Remotely

To communicate remotely with the MOVA unit requires the unit to be fitted with a modem connected to the PSTN line in the controller cabinet. The Instation will also require a modem connected to the PSTN telephone network and to a serial COM port on the PC at the Instation running the same MOVA communications program as used locally.

From the RMS Instation, simply select ‘Enable MOVA’ from the Outputs menu. See its associated help for assistance. The unit can also be contacted remotely from any PC with a modem as follows:

Start the PC and communications program using the instructions in section 9.6.1, which start on page 151, except when the program starts, select remote rather than local communications.

Before communicating with the MOVA unit, the modem connected to the PC must be instructed to ring-up the MOVA unit first. Note that the MOVA unit will automatically configure its modem to answer any telephone calls.

Reset the modem by typing ‘ATZ’ and wait for an ‘Ok’ response from the modem.

As instructed on the screen, enter ‘AT+MS=2,0’ to select V22bis protocol. If the modem responds with an error, it may be because it does not recognise that command. If so, try the older version of the command ‘ATF5’ or consult the modem’s documentation.

Enter ‘ATD’ followed by the telephone number of the site. Check whether an STD code is required and also check whether ‘9’, for example, needs to be dialled first to obtain an outside line.

To summarise, the following should appear on the screen…

`ATZ`	to reset the modem
`Ok`	accepted by the modem
`AT+MS=2,0`	to select V22bis protocol

`Ok`	accepted by the modem
`ATD 9 01202 123456`	ask the modem to dial the given number
`CONNECT`	response from modem indicating connection made
`Please wait`	message from MOVA application*

* Press 'Return' three times after the 'connect' message from the modem to connect to the MOVA application rather than the RMS OMCU application.

After a short delay, the MOVA unit will then ask for the password to validate remote access. The password is defaulted to 'AVOMIN' although it can be changed.

Once the password has been accepted, the MOVA unit communicates remotely in exactly the same way as it does locally. The only exception is that downloading plans and manually forcing stages are prohibited during remote communications.

To end communications with the MOVA unit, select the 'FI – Finish' option from the MOVA unit's main menu. This allows the MOVA unit to tidy-up and close the communications and hang-up, resulting in 'NO CARRIER' being displayed at the Instation. At this point, press F10 to close the MOVA Communications application.

9.7.2 MOVA Flags (LF and SF)

The MOVA flags can be viewed, and then changed, using the LF (Look at Flags) option from the main menu:

```
      stage force bits                  BST
  1  2  3  4  5  6  7  8 HI TO      Mar  Oct    MARK1 MARK2    FLAG(29-32)
  0  0  0  0  0  0  0  0  0  0       23   15     1234     0    0   0   0   0

 error phone watch con- MOVA ready hour stage stage  assess error 0=VA
 count  home  dog  trol mess  flag flow stuck dmnded –ment   log  1=MOVA
    0     0   13     0    0     1    0     0     1      1      0     0

 Do you want to Set Flags <S>
            Look at Flags <L>
         Clear force bits <C>
           set Force bits <F>
   or Return to MAIN MENU <R> ?
```

The majority of these flags can be ignored, either because they are more easily viewed and changed using the commissioning screen for example, or because the flags are set directly by other options from the main menu.

The Look Flags sub-menu gives five options. In reverse order these are:

Return to MAIN MENU <R>
The fifth and final option is used to return to the main menu.

Set Force bits <F>
Clear force bits <C>
The third and forth options allow force bits to be tested. This option is only provided for backward compatibility as it is recommended that the commissioning screen be used to test the force bits.

Look at Flags <L>

The second option displays all the flags and the menu again. Use this option to 'refresh' the display, e.g. when looking for a change of state of a particular flag.

Set Flags <S>

The first option can also be called directly from the main menu by typing 'SF' rather than 'LF'. This option allows some of the flags to be changed:

```
SET FLAGS :
 Flag(17)  ERROR COUNT   . . . . . . . . . . <X>
 Flag(18)  PHONE HOME  . . . . . . . . . . . <L>
 Flag(20)  ON CONTROL FLAG {1=ON CONTROL}  <C>
 Flag(21)  MOVA MESSAGE LOG  {note 1}  . . <M>
 Flag(23)  HOURLY FLOW LOG   {note 2}  . . <F>
 Flag(26)  ASSESSMENT LOG    {note 2}  . . <A>
 Flag(27)  ERROR LOG         {note 1}  . . <E>
 Flag(28)  VA {=0} / MOVA {=1} FLAG  . . . <V>
           for HELP {notes} enter  . . . . <H>

 ENTER CHOICE (or Q to quit) ...
```

The '**error count'** and the '**on control'** and '**VA/MOVA'** flags are more easily modified using the commissioning screen which is described in section 9.6. The **'phone home'** flag is covered in the following section below.

The MOVA messages, hourly flow, assessment and error log flags should not need to be changed as viewing these logs should be performed using the explicit options from the main menu. However, the logging of hourly flow and assessment data can be switched on and off using these flags. By default, the MOVA unit records both normal assessment data and hourly flow data in its assessment log. Changing the setting of these two flags can alter this.

For example, to get the MOVA unit to also record hourly flow data in its assessment log, type 'F' and press 'Return'. The MOVA unit will then display the current value of the flag and ask for the new value. At this point, enter '1' followed by 'Return' to set the hourly flow flag to '1'. This can be confirmed when the MOVA unit displays all the flags again.

```
 ENTER CHOICE (or Q to quit) ... F
 FLAG(23) =  0 Enter new value =
```

9.7.3 Phone Home Flag

The **'phone home flag'** is one of the many flags that can be viewed using the LF (Look at Flags) option from the main menu, see above.

If the '**phone home flag'** is set to '99', either by the MOVA unit itself or directly by the user using the 'Set Flags' option, then the MOVA unit will 'Phone Home'.
The OMCU application within the unit will report 'MPH – MOVA Phone Home' to the RMS Instation (see section 13.6.2 which starts on page 226); the MOVA application does not actually phone home itself. In this case, the phone home flag returns to its original value, normally zero, as soon as the 'MPH – MOVA Phone Home' fault has been passed to the OMCU application. The fault will remain active in the OMCU (and at

the RMS Instation) until it is manually cleared by the operator at the Instation (and the Instation has phoned the OMCU).

Normally, the MOVA unit will only ‘phone home’ when it has detected an unrecoverable error, e.g. when its error count has reached or exceeded 20 preventing the MOVA unit putting itself back on-line.

However, by setting the ‘**Phone Home’** flag to a value in the range 1 to 20, the user can force the MOVA unit to phone home whenever the error count reaches this limit.

For example, it may be useful to set the ‘**Phone Home’** flag to ‘1’ to force a MOVA unit to ‘Phone Home’ whenever the error count is set to ‘1’ or higher, i.e. whenever the unit detects any fault. Alternatively, setting the flag to ‘5’ would force the MOVA unit to ‘Phone Home’ only after more serious faults.

9.7.4 View MOVA Messages (VM)

The commissioning screen is mainly concerned with checking the I/O connections to the MOVA unit. To aid diagnosis of run-time problems with the MOVA algorithm, MOVA produces a series of output messages.

To view these MOVA messages, select the ‘VM - View MOVA Messages’ option from the main menu:

```
ENTER OPTION . . .  VM

Enter number of minutes messages output for <1-9> or 0 for continuous
   (NB – Press ANY key to pause messages)  ENTER NUMBER ...

Abandon messages now ? (y/n)Y

Return to continue
```

Enter ‘0’ so that the MOVA unit outputs messages continuously since the messages can be stopped at any time by simply pressing any key and then pressing ‘Y’ to confirm that you do wish to stop the messages. The main menu will re-appear after ‘Return’ is pressed.

The messages themselves are by no means self-explanatory because it is essential to minimise the amount of text within each message.

Once the messages start appearing, press the ‘F3’ key and the MOVA Communications application will show a full screen display of the information it receives in the messages in a much more understandable form.

To exit view messages, press the ‘F4’ key to close down the full screen displays and then press any key to inform the MOVA unit that no more messages are required.

9.7.5 Other Menu Options

Details about displaying the average flows and the assessment log can be found in the document AG12 available from TRL.

If printouts of the various logs are required, then the log should be displayed on the screen as normal and the output recorded to a file on the PC.

9.7.6 MOVA Detector Status Output

The detector status area of the MOVA Commissioning screen is capable of displaying the status of up to 64 detectors. It should be noted that this is the true detector state only where the detector is designated in the MOVA configuration data set. Where a detector is not designated it will be displayed as inactive. Care should therefore be taken when verifying a MOVA installation, if a detecor is displayed as inactive when a vehicle crosses it then this may be because the MOVA configuration is wrong and not that the detector is defective. The detector operation should be double checked on the controller with the IOP handset command.

Similarly if if the controller DFM has timed out the detector will may be forced active or inactive on the MOVA Commissioning screen. View the controller fault log to check this.

9.8 Dual Stream MOVA

Release PB686 for GEMINI² now supports dual MOVA streams. The dual traffic streams can be monitored and controlled either via the serial interface, where a ST800 controller is available, or through up to three BUS/MOVA I/O cards, where a free standing installation is required.

9.8.1 Operator Interface

The operator interaction is conducted as presently either locally via the handset interface or remotely via a modem link. The primary difference is that now two streams can be accessed. This has affected some of the handset commands.

9.8.1.1 LDV

As before, LDV=7 will enable a single MOVA kernel. If single stream mode is selected operation will be as the existing MOVA 5 application.

To select dual stream mode LDV=27 should be entered.

9.8.1.2 LIN

There is no difference to the license number command. A single license number will permit dual streams to operate.

9.8.1.3 INI

When in dual stream mode INI=70 will initialise stream 0 and INI=71 stream 1.
Entering INI=2 will result in a warning message indicating the above. INI=3 will initialise both streams and the OMCU data.

9.8.1.4 MOVA

If dual stream operation is functioning, entering ‘MOVA’ will now result in a text dialog asking which stream the operator wishes to access. On selecting a stream (0 or 1) subsequent actions will be with that MOVA kernel. Once a particular stream has been selected’ operation appears as per the single stream mode. The two streams operate independently so there are separate persistent data storage areas for each stream.

On a local handset connection, when exiting the MOVA function ('FI' command) operation will revert to the normal handset interface. To select the other stream 'MOVA' must be entered again.

On a remote interface FI will drop the telephone call. To select the alternate stream but remain within the same call the special character '@' can be entered. The stream selection dialog will then reappear without terminating the call.

9.8.2 Serial Interface to Controller

The serial protocol from the controller to Outstation provides a status message supporting up to 64 detector status bits and 32 green confirms. In the Outstation to controller direction there is a capacity for up to 32 force bits (though MOVA 5 supports only 10 per stream). This capacity must be split across both streams and a stream 1 controller ready bit must be generated in the controller using conditioning.

9.8.2.1 Detector Inputs

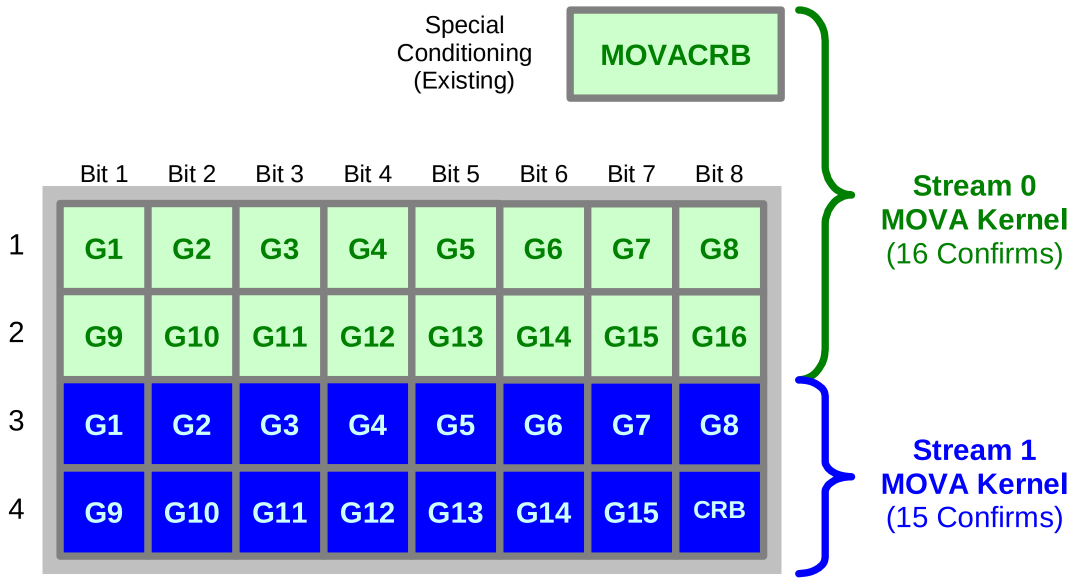
The 64 detector bits can be allocated as required across both streams assuming the total does not exceed 64. For simplicity if possible it is recommended that detectors 1 to 32 be used for stream 0 and the 33 to 64 for stream 1.

CAUTION: The 64 detector inputs are shared by both streams and so the MOVA configurations should reflect this ie. In MOVA Setup the detectors for stream 0 should be allocated to different detector numbers to those for stream 1.

9.8.2.2 Stage Confirms

The stage confirms for the first stream start in the first reply word (see figure 21). The stage confirm bits for the second stream start in the third reply word, even if the first stream only uses 8 confirm bits. The Controller Ready Bit (CRB) for stream 0 is in the message header as for a single stream installation. The CRB for the second stream (word 4 bit 8) must to be set by special conditioning in the controller, e.g. by "MOVACRB=CRB2".

Figure 21 – Dual Stream MOVA Stage Confirm Bit Field Designation



9.8.2.3 Force Bits

The force bits for the first stream start in the first control word (see figure 22). The force bits for the second stream start in the third control word, even if the first stream only uses 8 force bits. The take-over bits (TO) for each stream are placed in the top bit of the second word of each stream. These are OR'd together and placed in the TO header field of the serial message. Thus the special conditioning item 'MOVATO' in the controller will be true when either stream TO bit is active. **Care must therefore be taken when configuring the controller – to access each stream TO bit individually separate conditioning items must be defined.**

Note also when running the IC4 controller simulator, disabling the TO bit will disable the UTC / MOVA mode on both controller streams. To simulate disabling of a single MOVA stream the individual TO1 or TO2 bit must be deactivated.

Figure 22 – Dual Stream MOVA Force Bit Field Designation

	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	
1	F1	F2	F3	F4	F5	F6	F7	F8	Stream 0 MOVA Kernel
2	F9	F10	(11)	(12)	(13)	(14)	(15)	TO1	
3	F1	F2	F3	F4	F5	F6	F7	F8	Stream 1 MOVA Kernel
4	F9	F10	(11)	(12)	(13)	(14)	(15)	TO2	

9.8.3 Parallel Interface

A free standing installation will be limited by the capacity of the available I/O on the maximum of three BUS/MOVA cards. Maximum stream sizes have been designated as follows:-

Stream 0: Single card only fitted (first position)

	Force bits	10
	Detectors	32
	Green confirms	10

Stream 1: 1 or 2 cards fitted (second & third position)

	Force bits	10
	Detectors	64
	Green confirms	26

Pin I/O on the three cards is as follows:-

Figure 23 – BUS/MOVA Card Pinout

STREAM 0				STREAM 1							
Card 1; Connector 2 (Top)		Card 1; Connector 1 (Bottom)		Card 2; Connector 2 (Top)		Card 2; Connector 1 (Bottom)		Card 3; Connector 2 (Top)		Card 3; Connector 1 (Bottom)	
Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
1	Detector 25	1	Detector 1	1	Detector 25	1	Detector 1	1	Detector 57	1	Detector 33
2	Detector 26	2	Detector 2	2	Detector 26	2	Detector 2	2	Detector 58	2	Detector 34
3	Detector 27	3	Detector 3	3	Detector 27	3	Detector 3	3	Detector 59	3	Detector 35
4	Detector 28	4	Detector 4	4	Detector 28	4	Detector 4	4	Detector 60	4	Detector 36
5	Detector 29	5	Detector 5	5	Detector 29	5	Detector 5	5	Detector 61	5	Detector 37
6	Detector 30	6	Detector 6	6	Detector 30	6	Detector 6	6	Detector 62	6	Detector 38
7	Detector 31	7	Detector 7	7	Detector 31	7	Detector 7	7	Detector 63	7	Detector 39
8	Detector 32	8	Detector 8	8	Detector 32	8	Detector 8	8	Detector 64	8	Detector 40
9	CR	9	Detector 9	9	CR	9	Detector 9	9	Green Confirm 11	9	Detector 41
10	Green Confirm 1	10	Detector 10	10	Green Confirm 1	10	Detector 10	10	Green Confirm 12	10	Detector 42
11	Green Confirm 2	11	Detector 11	11	Green Confirm 2	11	Detector 11	11	Green Confirm 13	11	Detector 43
12	Green Confirm 3	12	Detector 12	12	Green Confirm 3	12	Detector 12	12	Green Confirm 14	12	Detector 44
13	Green Confirm 4	13	Detector 13	13	Green Confirm 4	13	Detector 13	13	Green Confirm 15	13	Detector 45
14	Green Confirm 5	14	Detector 14	14	Green Confirm 5	14	Detector 14	14	Green Confirm 16	14	Detector 46
15	Green Confirm 6	15	Detector 15	15	Green Confirm 6	15	Detector 15	15	Green Confirm 17	15	Detector 47
16	Green Confirm 7	16	Detector 16	16	Green Confirm 7	16	Detector 16	16	Green Confirm 18	16	Detector 48
17	Green Confirm 8	17	Detector 17	17	Green Confirm 8	17	Detector 17	17	Green Confirm 19	17	Detector 49
18	Green Confirm 9	18	Detector 18	18	Green Confirm 9	18	Detector 18	18	Green Confirm 20	18	Detector 50
19	Green Confirm 10	19	Detector 19	19	Green Confirm 10	19	Detector 19	19	Green Confirm 21	19	Detector 51
20		20	Detector 20	20		20	Detector 20	20	Green Confirm 22	20	Detector 52
21		21	Detector 21	21		21	Detector 21	21	Green Confirm 23	21	Detector 53
22		22	Detector 22	22		22	Detector 22	22	Green Confirm 24	22	Detector 54
23		23	Detector 23	23		23	Detector 23	23	Green Confirm 25	23	Detector 55
24		24	Detector 24	24		24	Detector 24	24	Green Confirm 26	24	Detector 56
25	0V	25	0V	25	0V	25	0V	25	0V	25	0V
26	0V	26	0V	26	0V	26	0V	26	0V	26	0V
27	Force Bit 9	27	Force Bit 1	27	Force Bit 9	27	Force Bit 1	27		27	
28		28		28		28		28		28	

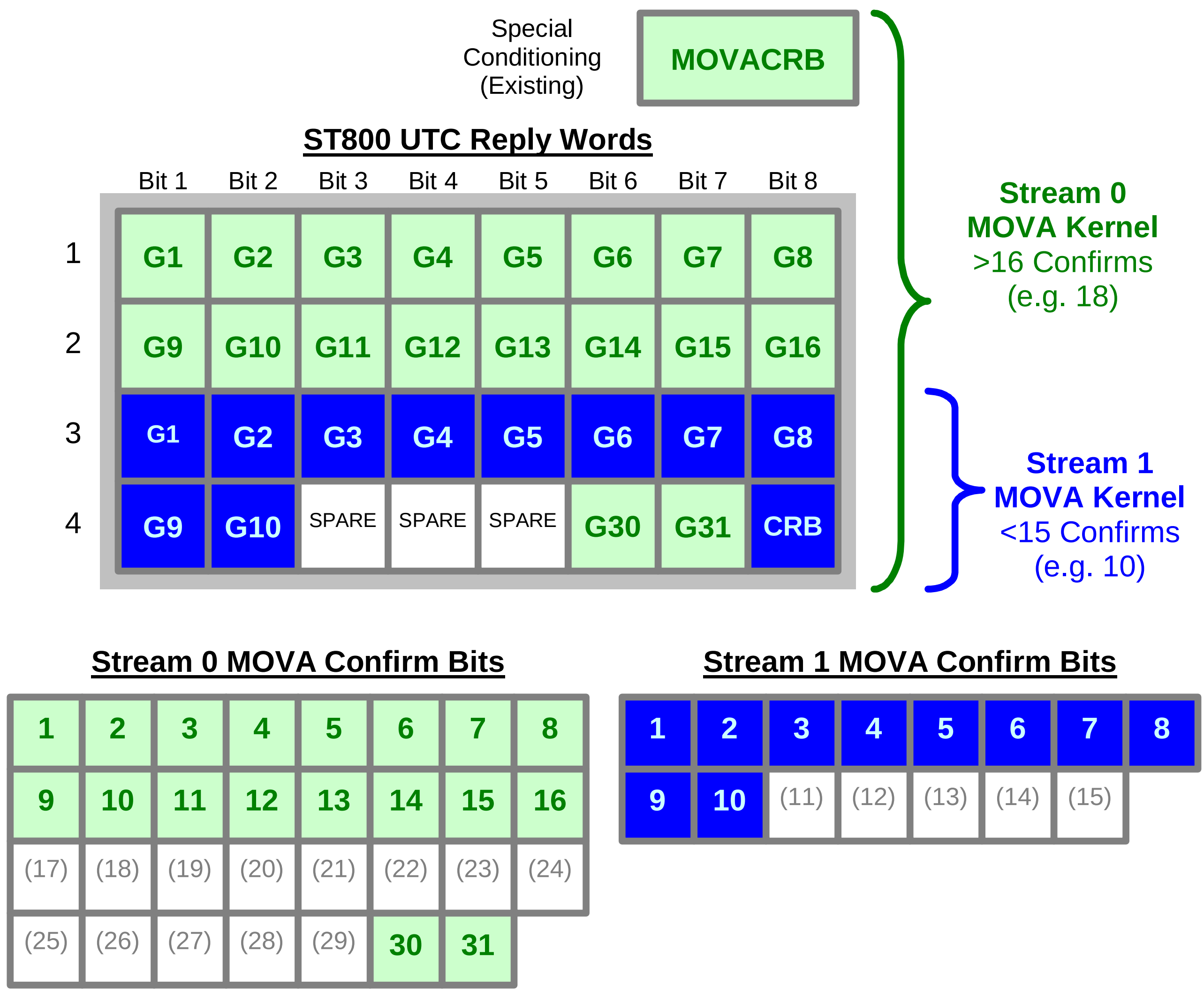
29	Force Bit 9	29	Force Bit 1	29	Force Bit 9	29	Force Bit 1	29		29	
30	Force Bit 10	30	Force Bit 2	30	Force Bit 10	30	Force Bit 2	30		30	
31		31		31		31		31		31	
32	Force Bit 10	32	Force Bit 2	32	Force Bit 10	32	Force Bit 2	32		32	
33	Force Bit 11	33	Force Bit 3	33	Force Bit 11	33	Force Bit 3	33		33	
34		34		34		34		34		34	
35	Force Bit 11	35	Force Bit 3	35	Force Bit 11	35	Force Bit 3	35		35	
36	Force Bit 12	36	Force Bit 4	36	Force Bit 12	36	Force Bit 4	36		36	
37		37		37		37		37		37	
38	Force Bit 12	38	Force Bit 4	38	Force Bit 12	38	Force Bit 4	38		38	
39	Force Bit 13	39	Force Bit 5	39	Force Bit 13	39	Force Bit 5	39		39	
40		40		40		40		40		40	
41	Force Bit 13	41	Force Bit 5	41	Force Bit 13	41	Force Bit 5	41		41	
42		42	Force Bit 6	42		42	Force Bit 6	42		42	
43		43		43		43		43		43	
44		44	Force Bit 6	44		44	Force Bit 6	44		44	
45		45	Force Bit 7	45		45	Force Bit 7	45		45	
46		46		46		46		46		46	
47		47	Force Bit 7	47		47	Force Bit 7	47		47	
48	T0	48	Force Bit 8	48	T0	48	Force Bit 8	48		48	
49		49		49		49		49		49	
50	T0	50	Force Bit 8	50	T0	50	Force Bit 8	50		50	

9.8.4 Advanced Programming of Stage Confirms with a Serial Interface to the Controller

While it is recommended for simplicity that the stage comfirms for each stream be kept in separate words of the controller serial message this is not absolutely necessary. If the first stream requires more confirm bits, and not all of the 15 confirm bits for the second stream are being used, then the first stream can use some of the reply bits in the fourth reply word.

In the following example, the second stream only requires ten confirm bits, freeing up five (bits 3 to 7). The first stream can then use two, G30 and G31. Either stream can use the remaining three bits (bits 3 to 5) at a later date.

Figure 24 – Stage Confirm Allocation - Advanced Use



9.8.5 Stream Interdependency

In certain installations it may be of benefit to allow one stream to have some knowledge of traffic flow in the other. To fulfil this requirement the MOVA lane over-saturation (SAT) and link end of saturation (ESLI) codes have been made available to the special conditioning facility within the OMCU. From here they can be passed to the controller through the special conditioning variable TOSL.

9.8.5.1 MOVA Over-saturation

MOVA outputs an over-saturation measure for up to 30 lanes, the quantity output being the number of consecutive over-saturation cycles for the lane, limited to a maximum of 9. This is a measure of activity in the MOVA stream.

As special conditioning can readilly not handle quantities the over-saturation measure shall be processed to record FALSE if the previous cycle was not over-saturated and TRUE if it was. It will be up to the destination application (controller in this case) to monitor the number of consecutive periods of over-saturation if required.

The Boolean value for each lane shall be stored as a bit in a 4 byte array which shall be accessible to special conditioning via the operands M0OSn and M1OSn where n is the index into the array and equals the lane number minus 1. For example M0OS3 is set when MOVA stream 0 lane 4 becomes over-saturated.

9.8.5.2 MOVA Link End Saturation Marker

MOVA also provides an end of saturation marker indicating whether link saturation has ended. This is a code between 0 and 9 indicating whether saturation has ended and the reason. This quantity variable shall be converted to a bit array variable for each link with bits 0 – 8 as shown in the following figure.

Figure 25 – MOVA End Saturation Conditioning Word

Bit index	Meaning when set	Corresponding ESLI Value
0	Normal end of saturation	1
1	End of saturation due to a combination of codes 5 and 6 if link persistently over-saturated (> 1 cycle)	2
2	End of saturation due to a queue on the X detector; green being wasted	3
3,4,5	End of saturation when link is over-saturated due to various capacity – maximising decisions. See MOVA documentation AG 44 4.2, 4.3	4 – 6
6	End of saturation link maximum reached.	7
7	End of saturation after green calculated from historical flows because detector faulty (AG 44 9,2d)	8
8	End of saturation because bonus green >=	9

	lost time etc.	
9 - 15	Not used	

The individual bit arrays shall be assembled into a 60 element array of type word which shall be accessible to special conditioning via the operands M0Enc and M1Enc where n is the index into the array and equals the link number minus 1 and c corresponds to the bit position of each condition within the indexed word.

9.9 MOVA 6 Enhancements

Two distinct features have been added to MOVA 6:

- The measurement of saturation flow on-line using the MOVA X-Detectores
- ‘Pedestrian short cycling’ which allows the highway authority to choose to change the behaviour of MOVA in a predetermined way when pedestrian demands are present.

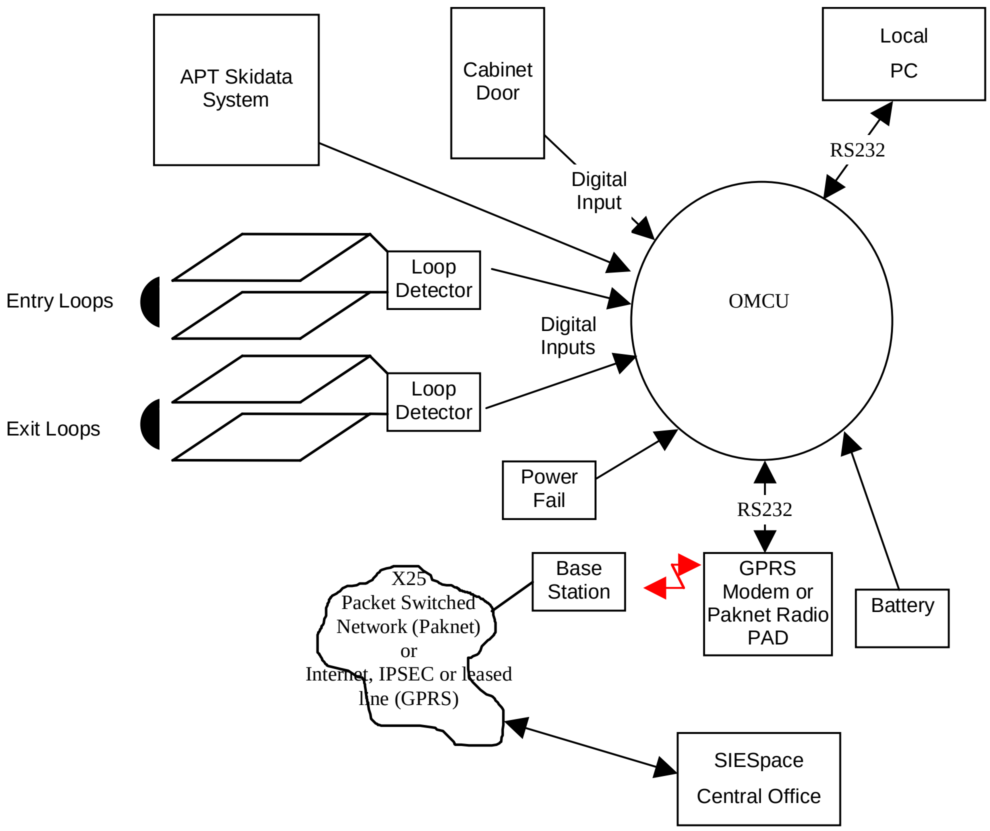
The former which measures and logs saturation flow is a facility added to gather data and help analyse MOVA performance. Of use mainly to TRL at this juncture.

The latter allows performance of a pedestrian priority facility to be customised using the PEDMAX variable.

10. CAR PARKS

10.1 Overview

The Car Park monitor facility is used to return occupancy data to a Siespace Instation. This information can then be used by the Instation to guide vehicles to car parks that have spaces. Communications with Siespace use either GPRS or PAKNET radio transmissions. Count information is usually gathered by loops, however, if an APT Skidata system is in use at the car park then Outstation can interface directly to this.



The main functions of the car park monitoring are as follows:

- To monitor car park entry and exit loop inputs
- To generate a difference count indicating the current occupancy of the car park
- To report car park occupancy to a Central Office based on occupancy threshold monitoring
- To report car park occupancy to a Central Office based on timetable events
- To report car park occupancy to a Central Office when requested by a Central Office
- To report faulty loops and clearances to a Central Office
- To report power-fail and power restore to a Central Office
- To report cabinet door state to a Central Office
- To set the car park occupancy when requested by a Central Office to specified value
- To modify specific Car Park facility configuration data when requested by a Central Office
- To provide handset commands to modify the Car Park facility configuration data

10.2 Outstation Status Message to SIESpace

The Outstation generates the same status report format regardless of the reason for generating the status report. The status report contains the following information:

- Occupancy status
- Occupancy
- Vehicle count for each configured loop
- DFM state for each configured loop
- Ramp mode
- Car park state
- Door state
- Power fail

When the Central Office resets the difference count, the Outstation replies as above with the occupancy and the vehicle count for each loop set to 0.

A status message is automatically transmitted to the SIESpace Instation when any of the following events occur:

- Cabinet Door is opened or closed
- Power fail is detected or restored
- Routine Poll is requested
- Ramp-up or Ramp-down mode is entered
- Car park state changes (i.e. Spaces, Almost Full, Full , Closed)

10.2.1 Routine Poll

The Outstation contains a timetable that indicates the periodic rate at which status messages must be transmitted to the Instation.

This ensures that the Instation will receive a status message with a minimum time interval specified in the table. If an event occurs that forces a status message to be transmitted (e.g. cabinet door is opened) then the routine poll timer is reset. This ensures that a routine poll is not transmitted just after the status as a result of the event.

The timetable is initialised to the values indicated in section 10.4.1; these settings can only be modified using a SIESpace Instation.

10.2.2 Loss of comms to PAKNET pad

On loss of communications with the PAKNET pad, the Outstation switches OFF / ON the pad in an attempt to re-establish comms. The longer that comms is lost, the less frequently retries are attempted.

- Initially, every 10 seconds for 10 attempts
- Then, every hour for 5 attempts
- Then, every 24 hours until comm’s is re-established

10.2.3 Loss of Comms to GPRS Modem

On loss of communications with the GPRS modem the Outstation will attempt to reconnect to Siespace at 7 minute intervals. If the Outstation detects that communications with the mobile phone network have been lost (indicated by the modem dropping its PPP session) then it will reinitialise the modem. If during the modem initialisation or connection to the mobile phone/GPRS network any errors are detected then the modem power will be cycled automatically.

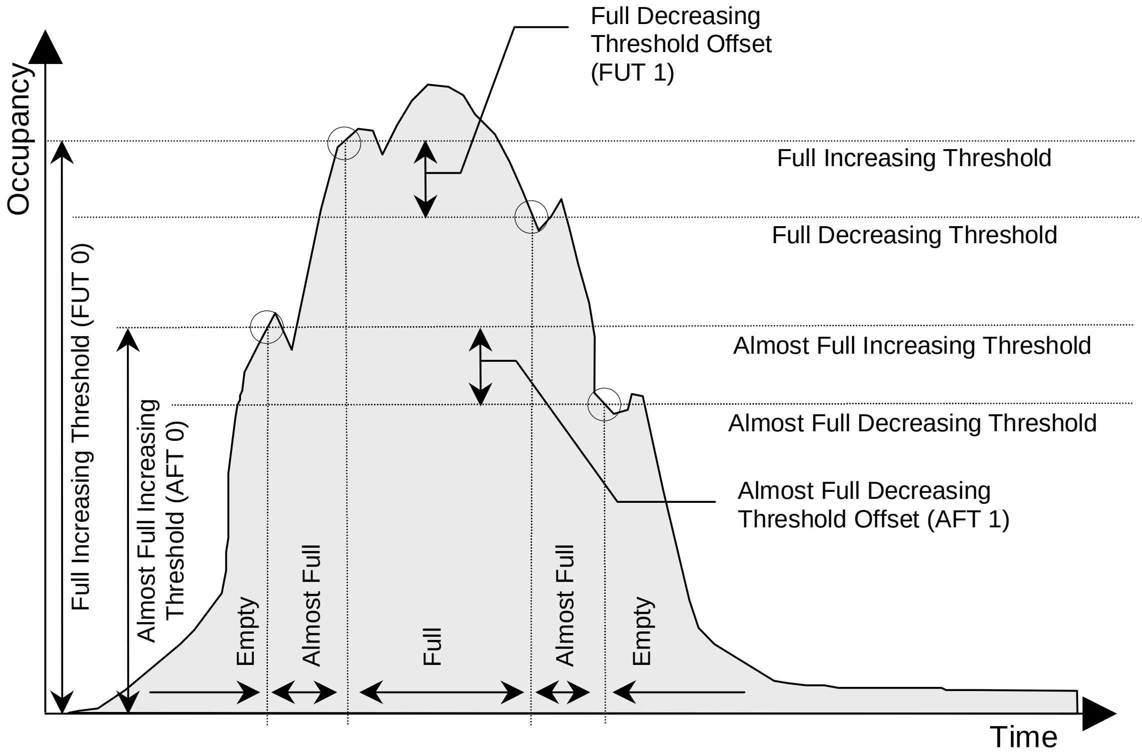
The LED on the MC35 Terminal modem shows the current state of the connection with the mobile phone/GPRS network (see section **Error! Reference source not found.**).

The middle green LED on the Outstation will be on when the unit has a connection to the Siespace Instation.

10.3 Difference Count and Thresholds Algorithm

The following describes the algorithm for the Outstation when used in the Car Park system.

Car Park States



OMCU Car Park Thresholds

The OMCU maintains 3 distinct states – ‘SPACES’, ‘ALMOST FULL’ and ‘FULL’.
The car park occupancy is compared to these thresholds to determine whether a state transition is required.

- The ‘SPACES’ state is set when the almost full decreasing threshold is crossed from the ‘ALMOST FULL’ or ‘FULL’ states.
- The ‘ALMOST FULL’ state is set when the almost full increasing threshold is crossed from the ‘SPACES’ state or when the full decreasing threshold is crossed from the ‘FULL’ state.
- The ‘FULL’ state is set when the full increasing threshold is crossed from the ‘SPACES’ or the ‘ALMOST FULL’ states.

A status report is sent to the Central Office whenever any one of these thresholds is crossed.

<u>Extrapolation</u>
A straight line extrapolation is made N minutes into the future to assess whether the car park is filling or emptying at a fast enough rate to require more frequent status reports to the Central Office.
The extrapolation is based on two occupancy values (a) the current occupancy and (b) the occupancy from M minutes earlier. M is the fill rate calculation period (handset command FCP).

The value of N depends on the state:

- If the state is ‘FULL’ then N is set to the ramp down time threshold.
- If the state is ‘SPACES’ or ‘ALMOST FULL’ then N is set to the ramp up time threshold.

If the state is ‘SPACES’ or ‘ALMOST FULL’ and the car park is filling fast enough so that the ‘FULL’ state would be reached in N minutes. Then status reports are sent to the Central Office at X minute intervals (ramp up mode) where X is set to the ramp up period. The first status report is sent as soon as the decision is taken to enter ramp up mode.

If the fill rate changes so that the ‘FULL’ state would not be reached within N minutes then status reports are no longer sent to the Central Office at X minute intervals. If the occupancy reaches the ‘FULL’ state, status reports are no longer sent at X minute intervals.

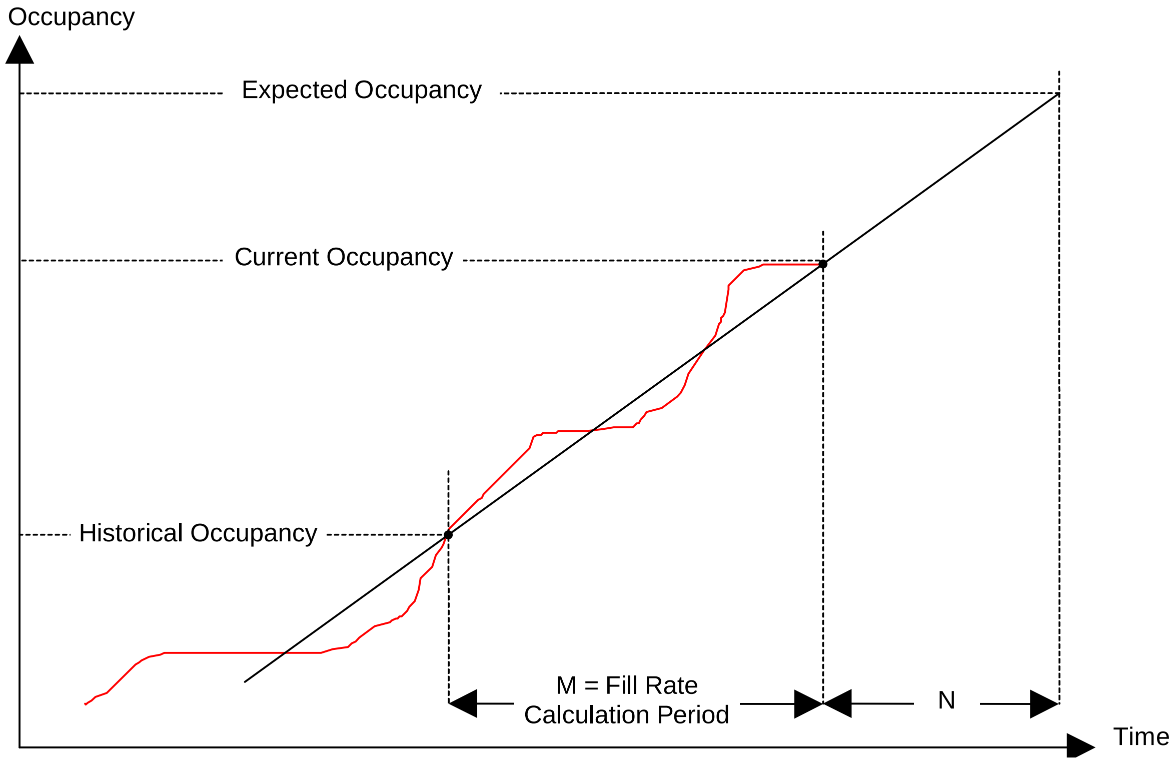


Figure 26 – Extrapolation

If the state is FULL and the car park is emptying fast enough so that the ALMOST FULL state would be reached in N minutes then status reports are sent to the Central Office at X minute intervals (ramp down mode) where X is set to the ramp down period. The first status report is sent as soon as the decision is taken to enter ramp down mode.

If the emptying rate changes so that the ALMOST FULL state would not be reached within N minutes then status reports are no longer sent to the Central Office at X minute intervals. If the occupancy reaches the almost FULL state, status reports are no longer sent at X minute intervals.

The Historical Occupancy is calculated and stored at 1-minute intervals.

10.4 Configuration

The Car Park and GPRS or PAKNET facilities are configurable from the handset. Sections 13.12 and 13.13 detail the relevant commands.

10.4.1 Car Park Configuration

This car park facility must be enabled via handset command LDV=3, this loads the following default values:

- Inputs 0 to 4 configured as Entry Loops
- Inputs 8 to 12 configured as Exit Loops
- Input 15 Door input
- ‘NO DETECT’ MONITORING DISABLED
- ‘Permanent detect’ monitoring disabled
- Car park full increasing threshold = 950
- Car park almost full increasing threshold = 900
- Car park capacity = 1000
- Car park almost full decreasing threshold offset = 20
- Car park full decreasing threshold offset = 20
- Fill rate calculation period = 15 minutes

The default values for the timetable (3 time slots only) are shown in the following table.

Time Slot	Frequency per Hour	Comments
00:00 to 07:00	1	Report sent every 60 minutes starting at 00:00
07:00 to 18:00	4	Report sent every 15 minutes starting at 07:00
18:00 to 00:00	2	Report sent every 30 minutes starting at 18:00

The handset commands are detailed in section 13.12.

10.4.2 Detector Fault Monitoring

Each of the car park entry and exit loops can be configured to have detector fault monitoring; by default this facility is disabled.

Each loop can provide a separate detector ‘Active’ and ‘Inactive’ time, the timing range is 0 to 255 minutes and hours respectively. Handset command CPL is used to set-up these times.

If the detector remains in either the ‘active’ or ‘inactive’ state for longer than the configured time then a failure is recorded. Once a DFM fault has been reported it remains active even if the detector starts to operate again.

To clear the fault firstly the detector fault must be fixed and have started to operate again (i.e. it has changed state at least once). Handset command RDF=1 must then be entered to clear the fault, the handset display will change to RDF:0 once all faults have been cleared (this may take up to 1 minute).

10.4.3 PAKNET Configuration

By default the PAKNET communication protocol is disabled. The following handset parameters have to be set-up to enable this facility.

RCA – Remote Comms user address is the 14-character address of the Instation.
RCT – Comms type – set to PAKNET.
RCB – Remote comms baudrate, set to 4800.
ADR – Each OMCU on a car park system has its own unique address.

10.4.4 GPRS Configuration

To configure the Outstation for GPRS communications refer to the document 'Installation and Commissioning Guide for GPRS based Siespace Systems' (refer to section 1.3). This document provides a description of the various paramaters required and gives examples of a typical setup.

10.5 Installation

10.5.1 PAKNET Interface Connector

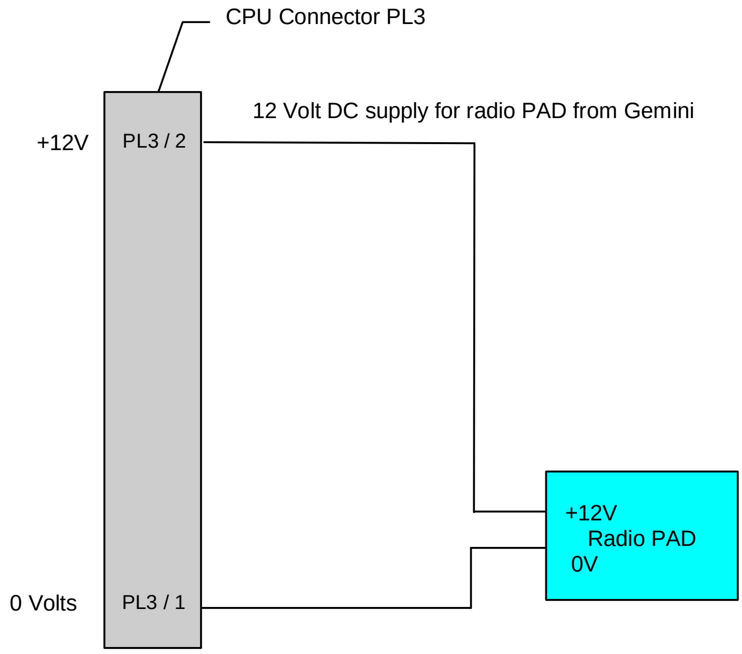
An additional interface connector must be placed between the OUTSTATION modem cable and the PAKNET pad.
The pin outs for this connector are as follows:

GEMINI		Direction	PAKNET Pad	
TX	3	------------->-------------	2	TX
RX	2	-------------<-------------	3	RX
RTS	7	------------->-------------	4	RTS
CTS	8	-------------<-------------	5	CTS
DSR	6	-------------<-------------	6	DSR
GND	5	---------------------------	7	GND
CD	1	-------------<-------------	8	CD
DTR	4	------------->-------------	20	DTR
RI	9	-------------<-------------	2	RI

10.5.2 PAKNET Radio Pad Power

The power to the radio pad is controlled by the Outstation. This allows the pad to be switched OFF / ON if a malfunction is detected.

The radio pad requires a 12V DC supply of power. This is supplied from the CPU card (PL3 connector pin 2). The CPU controls the power to this connector and thus can switch the radio pad power Off/On.



10.5.3 Door Switch

A Door switch can be provided to indicate to the Instation when the cabinet door has been opened. This input is connected to one of the low voltage inputs on the associated LMU I/O card. By default the door switch is assigned to input 16 (PL3 pins 15 and 16)

Handset command DOR can be used to modify the OMCU input assigned to this facility.

10.5.4 Count Detector Loops

Detectors are wired into the required count loops; these should be connected as detailed in section 5.6.2.4.

Where dual loop are used as the vehicle detector it will be necessary to setup the configuration data to reflect this.

10.5.5 GPRS Modem Based Systems

For installation of systems using GPRS refer to the document ‘Installation and Commissioning Guide for GPRS based Siespace Systems’ (refer to section 1.3).

For drawings of the GPRS car park Outstation and its wiring refer to Section 13.22B.2.

10.6 APT Skidata Interface

APT Skidata manufacture car park management systems. These consist of such items as barrier entry, ticketing, control offices, CCTV etc. The current Skidata equipment provides an interface using one of two communications protocols, Host Communications 1 or 2. Some older Skidata systems predate this interface.

The interface is LAN TCP/IP based. The Outstation is capable of interfacing with APT Skidata using Host Communications 1 or 2 using its network port connection. The customer will need to liase with APT Skidata to determine which version the equipment has (version 2 is the later and more flexible). The Host communications is not necessarily enabled on all Skidata equipment and a licence fee may be payable by the customer or car park operator to provide this functionality.

With Host Communications version 1, the Outstation would need exclusive access to the port on the SKIDATA equipment, with the later version 2 it is possible to share with any existing devices that may already be connected.

Communications with Siespace can be by either Paknet or GPRS.

10.6.1 Information required from APT Skidata

The following information is required from APT Skidata to setup the Outstation (The handset command for this parameter is shown in brackets) :

1) APT Facility Number (AFN)

Overall identifier for the installation controlled by the APT Skidata equipment (could contain multiple car parks).

2) Car Park Number (ACN)

Identifies individual car parks within a facility. With Host comms 2 multiple Outstation units can be connected to one facility and setup for different car park numbers to return data to Siespace. Host comms 1 only supports a single device hence we can only return a single car parks data.

3) APT Device Number (ADN)

Used to set a field in request messages sent from Outstation to the Skidata system. Set to 1 during development and testing but APT to advise if this needs to altered.

4) Counting category (ACC)

Counts on an APT Skidata systems are divided into categories to cover, for example, contract parking, public parking, people who have used credit cards etc. All categories selected as included will be added together to produce the final car park count. The customer must also be involved in choosing which counts go into producing the total shown on the VMS. It is possible that only categories containing public space counts would be required such that the signs show the number of public spaces available. Any combination of categories can be included.

The default APT count categories are :
1 - Short term parker
2 - Contract parker
3 - Total
4 - 24 - user defined

5) APT Comms version (ACV)

Selects either host comms version 1 or 2. Version 2 is the later and is preferred.

6) APT Port number (APN)

Defines the port number we connect to the APT Skidata equipment on. The default value is 10200.

7) APT IP Address (AIP)

Defines the IP Address of the APT Skidata equipment that is running the host comms interface.

8) Outstation IP Address (IPM0 or 3)

The IP address of the Outstation should be obtained from Skidata as it needs to be compatible with any other devices connected to the host comms port. For host comms version 1 this IP address will also need to be programmed into the APT Skidata equipment. Use IPM3 to set the subnet mask if required.

10.6.2 Configuration Handset commands

The following handset commands are required when configuring an Outstation to communicate with an APT Skidata system.

`ADS` – Enable APT Skidata Interface.
`AFN` – APT Skidata Facility Number.
`ACN` – APT Skidata Car Park Number.
`ADN` – APT Skidata Device Number.
`ACC` – APT Skidata Count Category.
`ACV` – APT Skidata Host Comms Version select.
`APN` – APT Skidata port number.
`AIP` – APT Skidata IP Address.
`DBG` – Debug Output.
`AFR` – Loss of comms with APT Skidata reporting to Siespace.
`IPM0` – IP Address of Gemini.
`IPR` – IP Reset Command.
`RCT` – Set for either Paknet or GPRS (configured as per previous sections).

11. UTMC OTU

11.1 INTRODUCTION

Sections 11.2 and 11.3 describe the configuration of the Outstation to provide the UTMC OTU facility, for the freestanding and semi-integral situations respectively. Prior to this procedure the outstation should have been installed and commissioned as defined in section 6.3 on page 111.

The I/O capability of the UTMC OTU is summarised below.

Freestanding UTMC OTU with 1 BUS/MOVA I/O Card
16 outputs for control bits
48 inputs for reply bits and SCOOT detectors
8 additional inputs are available on OTU CPU card for SCOOT detectors

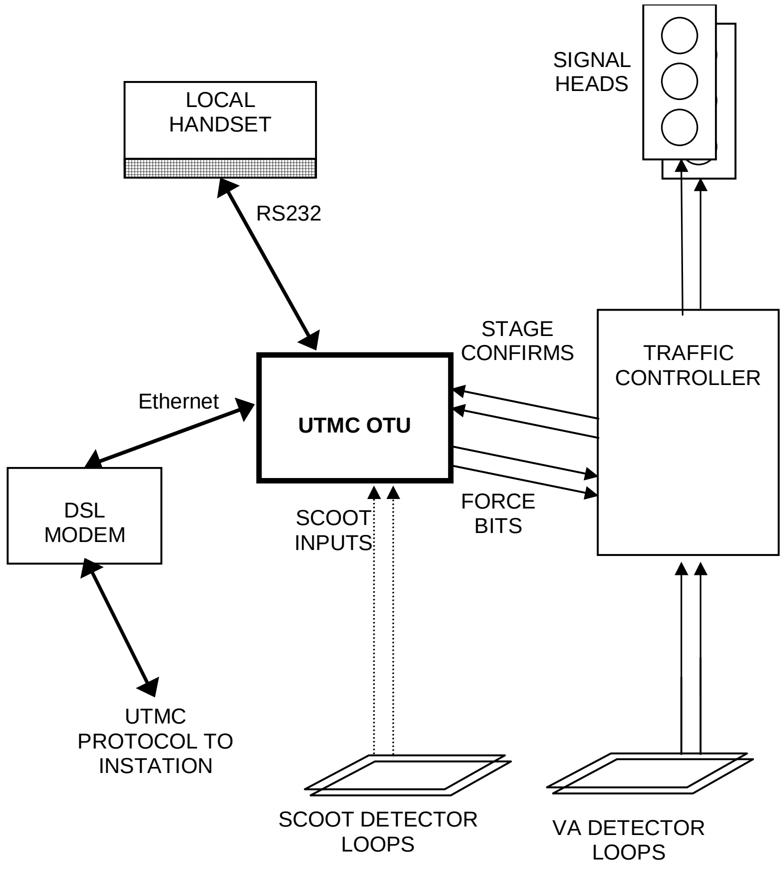
Freestanding UTMC OTU with 2 BUS/MOVA I/O Cards
32 outputs for control bits
96 inputs for reply bits and SCOOT detectors
8 additional inputs are available on OTU CPU card for SCOOT detectors

Semi-integral UTMC OTU and ST800/900
32 control bits to controller
32 reply bits from controller
8 inputs on OTU CPU card for SCOOT or count/queue/occupancy detectors

11.2 Configuration of a Freestanding UTMC OTU Installation

The figure below shows how a UTMC OTU can be set up for Force Bit control. This type of set-up is used when the controller provides a UK standard UTC style interface. It shows the 'Force Bits' from the OTU being fed into the traffic controller, via the TR2210 (TR0141) UTC Interface. It also shows the 'Stage Confirms' coming back from the traffic controller to the OTU. For SCOOT applications inputs from specially positioned 'flow' detectors can also be interfaced to the unit.

See section 5.1.2.1 on page 67 for cable wiring details of the digital inputs and outputs, which use the same controller interface signals as those allocated by MOVA.



11.2.1 Configuration Data

The UTMC Configuration data is programmed into the OTU via the handset.

The tables below show an example of an OTU Configuration with:

- 8 x Stage Force Controls
- 1 x Common Detector Demand
- 8 x Stage Confirms
- 2 x Counts
- 2 x HIOCC
- 1 x Fault Report Bit
- 1 x DFM Report Bit
- 1 x Handset Connected Bit
- 6 x SCOOT Detectors
- 2 x Occupancy Detectors
- 2 x Queue Detectors
- Environmental Sensor Information

	OTU – Control Bit Allocation Table							
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Byte 0	FH	FG	FF	FE	FD	FC	FB	FA
Byte 1		DX						

	OTU – Reply Bit Allocation Table							
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Byte 0	GH	GG	GF	GE	GD	GC	GB	GA
Byte 1		Count 15	Count 0	HIOCC 7	HIOCC 0	Fault	DFM	Handset
Byte 2	Scoot 1	Scoot 1	Scoot 1	Scoot 1	Scoot 0	Scoot 0	Scoot 0	Scoot 0
Byte 3	Scoot 3	Scoot 3	Scoot 3	Scoot 3	Scoot 2	Scoot 2	Scoot 2	Scoot 2
Byte 4	Scoot 5	Scoot 5	Scoot 5	Scoot 5	Scoot 4	Scoot 4	Scoot 4	Scoot 4
Byte 5	Scoot 23	Scoot 23	Scoot 23	Scoot 23	Scoot 22	Scoot 22	Scoot 22	Scoot 22
Byte 6					Que 13	Que 2	Occ 14	Occ 1
Byte 7	< --------------------- ENVIRONMENTAL SENSOR, BYTE 0 -------------------- >							
Byte 8	< --------------------- ENVIRONMENTAL SENSOR, BYTE 1 -------------------- >							

NB: Environmental sensor data (bytes 7 & 8 above) is entered via the **GED** handset command.

This configuration results in the following logical to physical mapping to the first Bus/MOVA (Digital) I/O card:

	OTU – Digital Output Port Map							
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Port 0	FH	FG	FF	FE	FD	FC	FB	FA
Port 1	TC	DX						

Output Ports 0 & 1 can be viewed using the **SOP 0** command which will show all 16 bits of these two ports. See handset command **SOP**, in section 13.8, starting on page 245.

	OTU – Digital Input Port Map							
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Port 0	GH	GG	GF	GE	GD	GC	GB	GA
Port 1	Que 13	Count 0u	Count 0a	HIOCC 7	HIOCC 0	Fault		
Port 2	Scoot 23	Scoot 22	Scoot 5	Scoot 4	Scoot 3	Scoot 2	Scoot 1	Scoot 0
Port 3	Cnt 15u	Cnt 15d	Cnt 15c	Cnt 15b	Cnt 15a	**/**Que 2	Occ 14	Occ 1

Input Ports 0 to 3 can be viewed using the **DIP** command. The display for this will show 8 bits for each port. See handset command **DIP**, in section 13.4, starting on page 220.

Note:

(a) (a)/ = The sense of this input is inverted using the GIS command. See section 13.20.2, starting on page 313.

(b) DFM is enabled on the loop inputs on ports 2 and 3.

11.2.2 Example Configuration Commands

The detail in this section demonstrates the use of the UTMC OTU commands to configure the Outstation to provide the configuration shown in the tables above.

It should be noted that any text following the command example is a comment and should not be entered.

11.2.2.1 Write Access Enable

PME=???

Comment: Enable write access to OTU data. Question marks should be replaced by the appropriate code specified by Siemens Poole. This is required to change any configuration data in the OTU.

11.2.2.2 Set IP Address & Gateway of the OTU

a) To manually set the IP Address to 137.223.152.216 use the following command sequence:

Enter the commands:

IPM 0=137.223.152.216
IPR=2

Comment: This will manually set the IP Address to 137.223.152.216. See IPM handset command, in section 13.19, page 308 for details of the 'gateway' etc.

b) For automatic setting of the IP Address ensure the OTU is connected to a network with a BOOTP server.

Enter the commands:

OID= <outstation name> Normally the site SCN is used to identify the outstation.
IPB= <server name> *Optional. Leave blank unless the system specifically requires this (e.g. where there are multiple BOOTP servers).*
IPR=1

Comment: Activation of the BOOTP sequence to obtain an automatic IP Address for the OTU. Use **IPA 0** to check that the outstation has been allocated an IP Address.

11.2.2.3 Load Default Settings into OTU

LDV=5

Comment: Resets the OTU to its default settings and allows subsequent 'control' and 'reply' configurations to be enabled via the **GOE** command.
This will load an OTU comprising:

2 x control bytes;
6 x reply bytes.

The first two reply bytes are mapped to the first two input ports. The remaining four bytes are allocated to 8 SCOOT loops.

11.2.2.4 Transmit Confirm

TCA=15
Comment: Assigns the Transmit Confirm signal to output line 15.

11.2.2.5 Define the number of Control & Reply Bytes

The OTU need to know how many **Control Words** it needs to respond to and how many **Reply Words** it needs to provide. Enter the following commands:

GCW 0=2
Comment: Number of control words for this OTU (2 in this case).

GRW 0=9
Comment: Number of reply words for this OTU (9 in this case).

11.2.2.6 Allocation of Control & Reply

Control:
The function of each of the Control Word bits are defined at the UTMC Instation and therefore do not require any further allocation. When the configuration of the OTU is complete and communication to the Instation is working the definition of these bits can be viewed by using the handset commands GCN and GRN.
See section 13.20.2 on page 313 for further details.

Reply:
We now need to define the detail of each Reply Word:

For Byte 0:
GRL 0 0=0
GRL 0 1=0
GRL 0 2=0
GRL 0 3=0
GRL 0 4=0
GRL 0 5=0
GRL 0 6=0
GRL 0 7=0
Comment: In this example Reply Byte 0 comes direct from the inputs so set all these to 0. The initial default for this command is 0 so there is no need to enter these commands manually. (Only included here for completeness).

For Byte 1:
GRL 1 0=13 ;Handset
GRL 1 1=48 ;DFM
GRL 1 2=14 ;Fault present
GRL 1 3=49 ;HIOCC unit 0
GRL 1 4=56 ;HIOCC unit 7
GRL 1 5=60 ;CQO unit 0
GRL 1 6=75 ;CQO unit 15
GRL 1 7=0
Comment: Reply Byte 1 definitions.

For Bytes 2 to 5:
GRL 2 0=200 ;SCOOT unit 0
GRL 2 4=201
GRL 3 0=202
GRL 3 4=203
GRL 4 0=204
GRL 4 4=205
GRL 5 0=222
GRL 5 4=223 ;SCOOT unit 23
Comment: Reply Bytes 2 to 5 definitions for the SCOOT inputs.

For Byte 6:
GRL 6 0=61 ;Reply byte 6, bit 0 = CQO unit 1
GRL 6 1=74 ;Reply byte 6, bit 1 = CQO unit 14
GRL 6 2=62 ;Reply byte 6, bit 2 = CQO unit 2
GRL 6 3=73 ;Reply byte 6, bit 3 = CQO unit 13
Comment: Reply Bytes 6 definitions for the Occupancy & Queue inputs.

For Bytes 7 & 8:
GRL 7 0=57 ;Reply bytes 7 & 8 = Environmental Sensor
Comment: Reply Bytes 7 & 8 definitions for the Environmental Sensor inputs. Reply byte 7 is for byte 0 of the sensor data and reply byte 8 is for byte 1 of the sensor data.

SCOOT loop input allocation

> ****NOTE****
> The GSA command references inputs from 0, ie
> GSA 0 = 0 allocates SCOOT loop 0 to input 1

GSA 0=16 ;SCOOT unit 0 uses input 16
GSA 1=17
GSA 2=18
GSA 3=19
GSA 4=20
GSA 5=21
GSA 6=255 ;Set to 255 to declare that input is not used
GSA 7=255 ;Set to 255 to declare that input is not used
GSA 22=22
GSA 23=23

Comment: This command allocates a SCOOT Loop to a particular input on the outstation. The first 8 SCOOT loops are allocated default inputs (see section 11.2.2.3 on page 190). The remaining loops are defaulted to 255.

COUNT/OCCUPANCY/QUEUE UNIT INPUT ALLOCATION/FUNCTION

GIA 0 0=13 ;CQO unit 0 uses input 13
GIA 0 1=1 ;CQO unit 0 is ‘N’ counter
GIA 1 0=48 ;CQO unit 1 uses input 48
GIA 1 1=4 ;unit type = ‘N’ occupancy

GIA 2 0=50 ;CQO unit 2 uses input 50
GIA 2 1=7 ;unit type = queue

GIA 3 0=0 ;CQO unit 3 is not used
GIA 3 1=0 ;CQO unit 3 is not used

GIA 13 0=15 ;CQO unit 13 uses input 15
GIA 13 1=7 ;unit type = queue

GIA 14 0=49 ;CQO unit 14 uses input 49
GIA 14 1=4 ;Unit type = ‘N’ occupancy

GIA 15 0=51 ;CQO unit 15 uses inputs 51 to 54
GIA 15 1=3 ;CQO unit 15 is 3 lane ‘N+1’ counter

Comment: This command allocates Count, Occupancy and Queue to a particular input on the outstation. The initial default for this command is 0 so there is no need to enter unused inputs manually. (Only included here for completeness).

UNIDIRECTIONAL LOOP INPUT ALLOCATION

GUD 0=54 ;U/D unit 0 uses inputs 54 & 55. 54 being the ‘up-stream’ loop and 55 being the ‘down-stream’ loop.
GUD 1=255 ;U/D unit 1 is not used
GUD 15=13 ;U/D unit 15 uses inputs 13 & 14

Comment: This command allocates the Unidirectional Loop to a particular input on the outstation. The initial default for this command is 255 so there is no need to enter unused inputs manually. (Only included here for completeness).

11.2.2.7 Count, Occupancy and Queue function Parameters

We now need to define the function of each of the special inputs:

QUEUE UNIT ACTIVE TIME (CALL TIME)
GAQ 2=2 ;Queue unit 2, active time = 2 sec
GAQ 13=3 ;Queue unit 13, active time = 3 sec

QUEUE UNIT INACTIVE TIME (CANCEL TIME)
GIQ 2=0 ;Queue unit 2, inactive time = 0 sec
GIQ 13=1 ;Queue unit 13, inactive time = 1 sec
Comment: These two commands define the Call and Cancel times for each of the Queue Loops. The initial default for this command is 0 so there is no need to specify 0 time manually. (Only included here for completeness).

COUNT WEIGHTING FACTOR
GCF 0=5 ;Unit 0 count weighting factor = 5
GCF 15=7 ;Unit 15 count weighting factor = 7

OCCUPANCY WEIGHTING FACTOR
GOF 1=6 ;Unit 1 occupancy weighting factor = 6
GOF 14=8 ;Unit 14 occupancy weighting factor = 8
Comment: These two commands define the Count and Occupancy Weighting Factors for each Count and Occupancy Loop. The initial default for the Count command is 5 and for the Occupancy command is 6, so there is no need to specify these manually. (Only included here for completeness.).

11.2.2.8 Input Sense Control

We now need to define the logical sense of the inputs:

GIS 0=00000000 ;Port 0 – no inversion
GIS 1=00000000
GIS 2=00000000
GIS 3=00000100 ;Port 3 – Queue unit 2 input inverted
Comment: This command defines the logical sense of each input. The initial default for this command is 0 so there is no need to specify no inversion manually. (Only included here for completeness.)

11.2.2.9 DFM Facility

We now need to define what the DFM timing parameters are and which inputs it should be applied to:

DFM ACTIVE AND INACTIVE TIMES
DTA 0=2 ;Stuck active timeout = 2 mins
DTI 0=180 ;Stuck inactive timeout = 18 hours

DFM INPUTS &TYPES
DEA 2 0=1 ;Dual DFM for Port 2 Bit 0
DEA 2 1=1

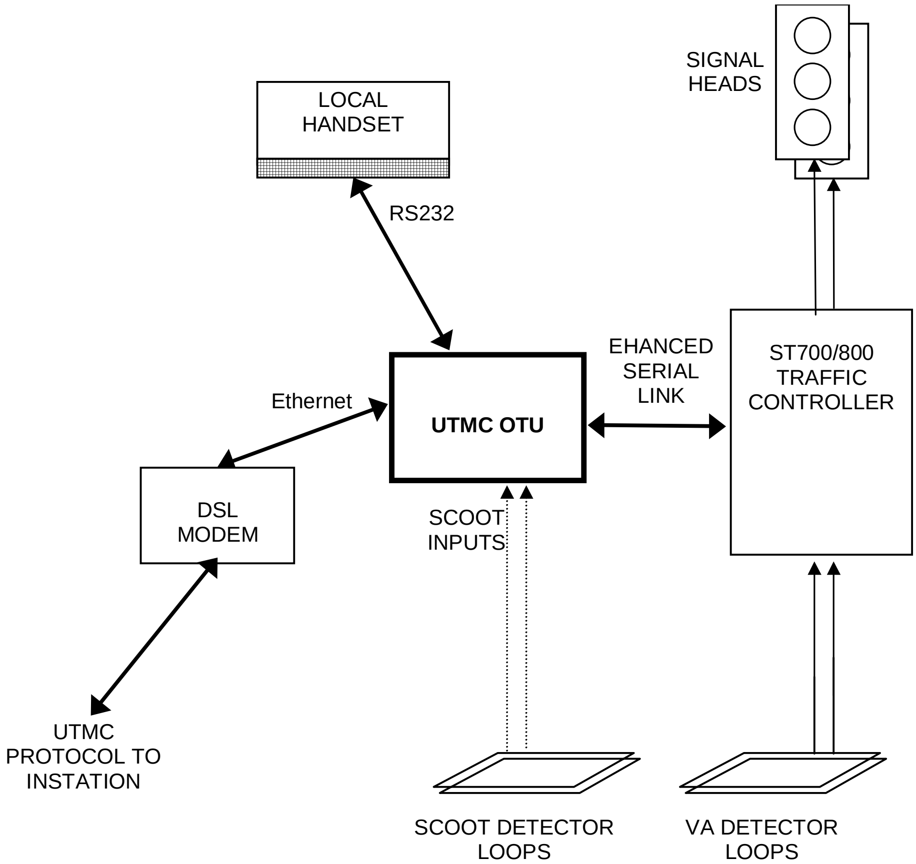
DEA 2 2=1
DEA 2 3=1
DEA 2 4=1
DEA 2 5=1
DEA 2 6=1
DEA 2 7=1 ;Dual DFM for Port 2 Bit 7
DEA 3 0=1
DEA 3 1=1
DEA 3 2=1
DEA 3 3=1
DEA 3 4=1
DEA 3 5=1
DEA 3 6=1
DEA 3 7=1 ;Dual DFM for Port 3 Bit 7

DEI 1 5=1 ;Single DFM for Port 1 Bit 5
DEI 1 6=1
Comment: These two commands define which inputs should be checked for Detector Faults. Dual DFM allows separate timeouts to be defined for 'stuck-active' and 'stuck-inactive', whereas using a single DFM applies the inactive timeout to both the 'stuck-active' and 'stuck-inactive' conditions.

11.3 Configuration of a Semi-Integral UTMC OTU Installation

The figure below shows how an OTU can be set up for the ST800/700 Enhanced Serial Link control. It shows all the information being fed between the OTU and the traffic controller, via the ST800/700 Enhanced Serial Link.

Separate inputs on the CPU card are provided to permit connections for up to 8 associated SCOOT detectors. This requires cableform part number 667/1/30607/000.



11.3.1 Configuration Data

The UTMC Configuration data is programmed into the OTU via the handset. The following sections detail the specific commands to enable this facility.

11.3.2 Example Configuration Commands

It should be noted that any text following the command example is a comment and should not be entered.

11.3.2.1 Write Access Enable

PME=???

Comment: Enable write access to OTU data. Question marks should be replaced by the appropriate code specified by Siemens Poole. This is required to change any configuration data in the OTU.

11.3.2.2 Set IP Address and Gateway of the OTU

a) To manually set the IP Address to 137.223.152.216 use the following command sequence:

Enter the commands:

IPM 0=137.223.152.216
IPR=2
Comment: This will manually set the IP Address to 137.223.152.216. See IPM handset command, in section 13.19, page 308 for details of the 'gateway' etc.

b) For automatic setting of the IP Address ensure the OTU is connected to a network with a BOOTP server.

Enter the commands:

OID= <outstation name> Normally the site SCN is used to identify the outstation.
IPB= <server name> Optional. Leave blank unless the system specifically requires this *(e.g. where there are multiple BOOTP servers).*
IPR=1
Comment: Activation of the BOOTP sequence to obtain an automatic IP Address for the OTU. Use **IPA 0** to check that the outstation has been allocated an IP Address.

11.3.2.3 Load Default Settings into OTU

LDV=8
Comment: Resets the OTU to its default settings and allows subsequent 'control' and 'reply' configurations to be enabled via the **GOE** command. This also enables the Enhanced Serial Link to the controller. Check the link status using the **EEL** command.
The first four reply bytes are mapped to the reply bytes configured on the controller. See the controller configuration sheets for details of the allocation of bits for this reply data.

11.3.2.4 Transmit Confirm

TCA=15
Comment: Assigns the Transmit Confirm signal to control bit 15.

11.3.2.5 Define the number of Control and Reply Bytes

The OTU need to know how many **Control Words** it needs to respond to and how many **Reply Words** it needs to provide. Enter the following commands:

GCW 0=2
Comment: Number of control words for this OTU (2 in this case).

GRW 0=8
Comment: Number of reply words for this OTU (8 in this case).

11.3.2.6 Allocation of Control and Reply

Control:
The function of each of the Control Word bits are defined at the UTMC Instation and must match the corresponding bit configurations in the controller. Therefore these do not require any further allocation. When the configuration of the OTU is complete and communication to the Instation is working the definition of these bits can be viewed by using the handset commands **GCN** and **GRN**. See section 13.20.2 on page 313 for further details.

Reply:
The first four bytes are pre-allocated for controller data via the serial link. The specific byte/bit definitions will depend on the associated controller configuration.

For Bytes 0 to 3:
GRL 0 0:76
GRL 0 1:76
. .
. .
. .
GRL 3 5:76
GRL 3 6:76
GRL 3 7:76
Comment: The response to the **GRL** command in this range should be **76** to show that the data is sourced from the controller via the serial link.

For Bytes 4 to 7:
GRL 4 0=200 ;SCOOT unit 0
GRL 4 4=201
GRL 5 0=202
GRL 5 4=203
GRL 6 0=204
GRL 6 4=205
GRL 7 0=206
GRL 7 4=207 ;SCOOT unit 7
Comment: Reply Bytes 4 to 7 definitions for the SCOOT inputs.

SCOOT loop input allocation
GSA 0=144 ;SCOOT unit 0 uses input 144
GSA 1=145
GSA 2=146
GSA 3=147
GSA 4=148
GSA 5=149
GSA 6=150
GSA 7=151
Comment: This command allocates a SCOOT Loop to a particular input on the outstation CPU card.

11.3.2.7 DFM Facility

The controller provides its own DFM facility for all its inputs. Any SCOOT inputs on the OTU are monitored by the Instation. No further configuration is required.

11.4 Initialising the OTU

When the OTU has been configured and the data checked it can now be connected to the Instation.

Enter the following enable command:

GOE =1

The Outstation should reply with:

GOE: 1

If it replies with:

GOE: 255 ;This indicates that the operating mode is incorrect (see handset command OPM on page 250). This could be due to configuration data corruption or failure to enter the **LDV** command.
Re-enter the appropriate **LDV** command and re-enter the Configuration Data.

If it replies with:

GOE: 254 ;This indicates that the license code is invalid. See section 6.3, step 23 on page 115.

UTMC OTU Configuration is now complete.

12. UTMC VMS

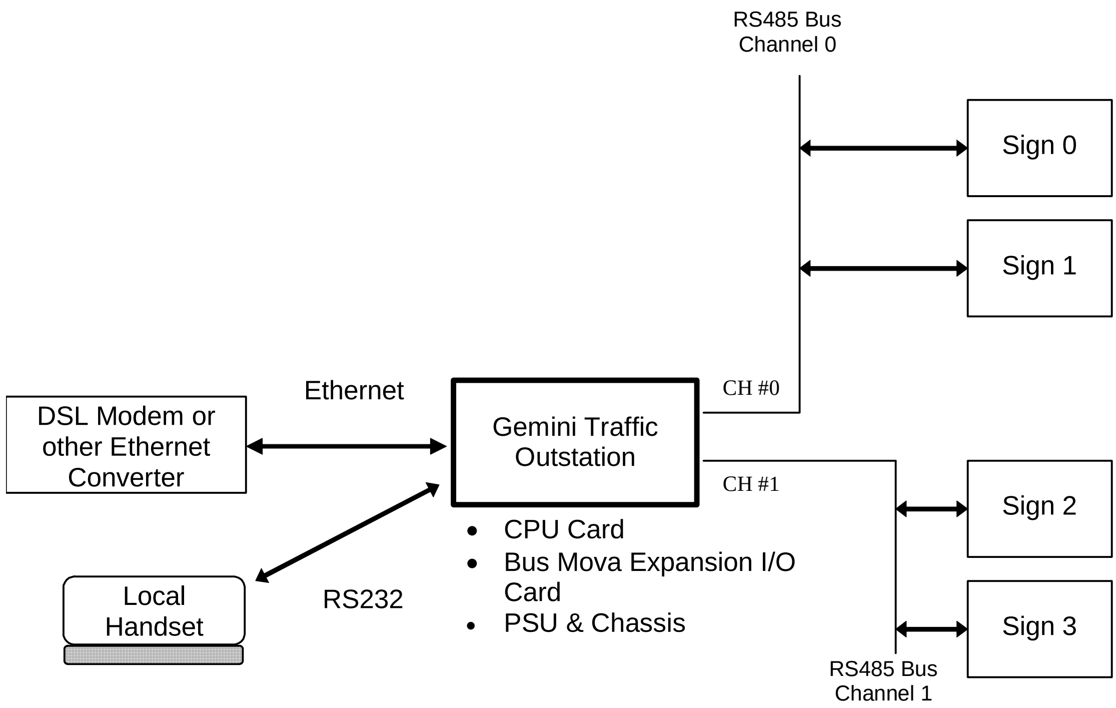
12.1 INTRODUCTION

This section describes the configuration of the Outstation to provide the UTMC VMS facility. Prior to this procedure the outstation should have been installed and commissioned as defined in section 6.3 on page 111.

12.2 UTMC VMS Configuration

The Outstation can be configured to provide an interface between a SIESpace Instation and up to 8 UVMS signs via an IP based network using the UTMC VMS system.

The following diagram shows an example configuration of the UTMC VMS System:



UTMC VMS System Overview

When the Outstation is configured in UTMC VMS mode, UTMC VMS messages from the SIESpace Instation arrive via the Ethernet connection. The Outstation converts these messages into the SIESpace protocol and transmits them to the required sign via the RS485 Bus. The Outstation also collects status information from the VMS signs and this information can be integrated remotely via the UTMC VMS protocol over the Ethernet link.

12.2.1 Configuration Commands

The detail in this section demonstrates the use of the handset commands to configure the Outstation for UTMC VMS operation. The example given is for a single VMS Sign attached to the UTMC Outstation. If this is not the case then some of the commands will need to be re-entered with different indexes to 'point' to the other signs.

It should be noted that any text following the command example is a comment and should not be entered.

12.2.1.1 Write Access Enable

PME=???

Comment: Enable write access to OTU data. Question marks should be replaced by the appropriate code specified by Siemens Poole. This is required to change any configuration data in the OTU.

12.2.1.2 Set IP Address and Gateway of the VMS Outstation

a) To manually set the IP Address to 137.223.152.216 use the following command sequence:

Enter the commands:

IPM 0=137.223.152.216
IPR=2

Comment: This will manually set the IP Address to 137.223.152.216. See IPM handset command, in section 13.19, page 308 for details of the 'gateway' etc.

b) For automatic setting of the IP Address ensure the OTU is connected to a network with a BOOTP server.

Enter the commands:

OID= <outstation name> Normally the site SCN is used to identify the outstation.
IPB= <server name> *Optional. Leave blank unless the system specifically requires this (e.g. where there are multiple BOOTP servers).*
IPR=1

Comment: Activation of the BOOTP sequence to obtain an automatic IP Address for the OTU. Use **IPA 0** to check that the outstation has been allocated an IP Address.

12.2.1.3 Configure the RS485 Serial Ports

The associated VMS signs will be connected to the Outstation using the RS485 serial interfaces provided a Bus/MOVA I/O card.

The sign should be connected to one of the RS485 ports on this card. The physical connections are defined in section 5.6.4 on page 96.

It will also be necessary to correctly terminate this communication line and the details for this can be found in section 5.2.5 on page 75.

It will then be necessary to specify which RS485 port is being used and what the transmission characteristics are:

POC 0 0=4
POC 0 1=0
POC 0 2=0
POC 0 3=1
POC 0 4=8
Comment: In this example Port 0 is being used and is configured for 9600 baud, no parity, one stop bit and 8 data bits.

POS =1
Comment: To enable the settings defined by **POC** to be used.

12.2.1.4 Configure the UTMC VMS Application Settings

LDV=6
Comment: Resets the VMS to its default.
This will provide the basic sign definition of:

12 x Characters Wide;
2 x Characters High (i.e. two rows).

VMP=<password>
Comment: Specified by the customer to set the UTMC VMS remote access password.

VMD=20
Comment: Set the delay that should be used between each access of the UVMS signs. The value is in seconds and should not be less than 10 seconds.

VMI=60
Comment Sets the instation inactivity timer that must elapse without communication from the Siespace instation before the Outstation will stop communication with the signs. This is used on some systems to cause the signs to blank (actual action depends on the configuration of the VMS Signs). The inactivity timer starts counting from the time of the sign SNMP login. The value is in minutes and should not be more than 120 minutes.

12.2.1.5 Configure the Individual VMS Sign Settings

The Outstation needs to be configured for each sign that is connected to it. The major index on the **VMC, VMA, VMT, VMH, VMW** and **VML** commands is used to select the required sign (0 to 7).

Note: Signs must be configured in sequence with no gaps. It is not possible to use just signs 0 and 2, with sign 1 disabled.

VMN 0 = 0
Comment: Sets the RS485 channel number that the sign is connected to.

VMA 0 = 1
Comment: Set the RS485 Bus address that the sign is using.

VMT 0 = SOUTH CAR PARK ACCESS
Comment: Set the description of the VMS sign.

VMH 0 = 2
Comment: Set the number of rows the sign has.

VMW 0 = 12
Comment: Set the number of characters in each row.

VML 0 = 2
Comment: Specify if 'Lanterns' are fitted. In this case '2' means no.

12.2.1.6 Initialising the VMS Outstation

When the VMS Outstation has been configured and the data has been checked, it can now be connected to the Instation.

Enter the enable command:

VMS =1
Comment: Enter the VMS enable command to accept commands from the UTMC Instation.

Check there are no entries in the Fault Log (FLG).

UTMC VMS Configuration is now complete.

13. HANDSET FACILITIES

13.1 INTRODUCTION

Access to the Outstation configuration and status information is gained by entering codes on an approved handset and interpreting the response on the display.

The handset port connector is a 25-way female D-type and operates at 1200, 9600, 19200 or 56700 baud, on first receiving characters after the handset is plugged in.

This section lists all the handset codes, together with their data ranges and access levels for the OMCU, Bus Processor, Car Park and MOVA* applications.

The following list gives a summary of all the Handset codes in an alphabetical order, for use as a quick lookup reference guide:

HANDSET CODES

HSET CMD	MAJOR INDEX	MINOR INDEX	DATA	DESCRIPTION	ACCESS	SECT REF
ACC	-	1 – 23	0 – 1	APT SKIDATA COUNTING CATEGORY	MAINT	13.12
ACF	-	-	0 – 1	CLF ACTION ON COMPLIANCE FAIL	R/O	13.14.2
ACN	-	-	0 – 254	APT SKIDATA CAR PARK NUMBER	MAINT	13.12
ACT	1 – 30	0 – 3	VARIOUS	OUTPUT ACTION LIST (BEACONS) OUTPUT ACTION LIST (SIETAG) OUTPUT ACTION LIST (RTIG)	MAINT	13.10.2 13.10.3 13.10.4
ACV	-	-	0 – 1	APT SKIDATA HOST COMMS VERSION	MAINT	13.12
ADN	-	-	10 ASCII	APT DEVICE NUMBER	MAINT	13.12
ADR	-	-	0 – 254	REMOTE COMMS OMCU ADDRESS	MAINT	13.13
ADS	-	-	0 – 1	ENABLE APT SKIDATA INTERFACE	MAINT	13.12
AEC	-	-	0 –FFFF	ACCUMULATED ERROR COUNTS	R/O	13.3
AFN	-	-	10 ASCII	APT SKIDATA FACILITY NUMBER	MAINT	13.12
AFR	-	-	0 – 1	APT SKIDATA LINK FAIL REPORTING	MAINT	13.12
AFT	-	0 – 1	0 – 16838	CAR PARK ALMOST FULL THRESHOLD	MAINT	13.12
AIP	-	-	15 ASCII	APT SKIDATA EQUIPMENT IP ADDRESS	MAINT	13.12
AMX	-	-	0 – 3	ALT. MAX. SET NO.	R/O	13.3
APL	-	-	0 – 15, 255	ACTIVE CLF PLAN	R/O	13.14.1
APN	-	-	NUMBER	APT SKIDATA PORT NUMBER	MAINT	13.12
ARM	-	-	0 – 2	SIETAG AREA MODE	MAINT	13.10.3
ARV	-	-	0 – F	SIETAG AREA VALUE	MAINT	13.10.3
ASS	0 – 255	0 – 10	VARIOUS	OUTPUT ASSOCIATION LIST (BEACONS) OUTPUT ASSOCIATION LIST (SIETAG) OUTPUT ASSOCIATION LIST (RTIG)	MAINT	13.10.2 13.10.3 13.10.4
BAS	-	-	0 – 2	SET DISPLAY BASE	OPEN	13.8
BFO	-	-	0 – 255	BUS DFM FAULT OUTPUT	MAINT	13.10.1
BFR	-	-	0 – 2	BUS DFM FAULT REPORTING TYPE	MAINT	13.10.1
BFT	-	0 – 15	0 – 255	BUS DFM FAULT TIME	MAINT	13.10.1
BMD	-	-	0 – 9	BEACON MESSAGE DELAY	MAINT	13.9
BPR	-	-	NUMBER	BOOTP RETRY TIMEOUT	MAINT	13.19
BID	-	0 – 15	0 – FF	BEACON IDENTITY (BEACONS) BEACON IDENTITY (SIETAG) BEACON IDENTITY (RTIG)	MAINT	13.10.2 13.10.3 13.10.4
BRC	-	-	0 – 65535	BUS RECEIVE MESSAGE COUNT	MAINT	13.9
BRP	-	-	0 – 11	BUS RECEIVE PORT	MAINT	13.9
BRX	-	-	VARIOUS	BUS RECEIVE MESSAGE SIMULATION	MAINT	13.9
BSZ	-	-	1 - 1024	RMS BLOCK SIZE FOR 8-BIT COMMS	MAINT	13.8.8
CAL	-	-	0 – 1	CALL INSTATION – MANUALLY	MAINT	13.8
CAO	0 – 31	0 – 3	0 – 255	CLF ACTION OUTPUTS	R/O	13.14.2
CBR	-	-	0,101-105	CONTROLLER BAUD RATE	MAINT	13.8
CCC	-	-	0 – 255	CLF COMPLIANCE FAIL CLEAR TIME	R/O	13.14.2
CCF	-	-	0 – 255	CLF COMPLIANCE FAIL TIME	R/O	13.14.2
CCL	-	0 – 9	0 – 255	CURRENT CAR PARK LOOP COUNTS	R/O	13.12
CCP	-	-	1	CALL CURRENT PLAN	MAINT	13.14.1
CCT	-	-	0 – 255	CURRENT CYCLE TIME	R/O	13.14.1
CCU	0 – 1	0 – 7	0 – 255	CALL CANCEL TIMERS	R/O	13.4

HSET CMD	MAJOR INDEX	MINOR INDEX	DATA	DESCRIPTION	ACCESS	SECT REF
CDC	0 – 1	0 – 9	0 – 255	CALL DISCONNECT CAUSE STATS	MAINT	13.7.1
CDI	-	-	0 – 255	CLOCK DRIFT FROM INSTATION	R/O	13.14.3
CEC	-	0 – 31	0 – 1	CLF ENABLED COMPLIANCE	R/O	13.14.2
CGR	-	0 – 7	0 – 31	CURRENT CLF GROUP	R/O	13.14.1
CGT	-	0 – 7	0 – 255	CURRENT CLF GROUP TIME REMAINING	R/O	13.14.1
CID	-	-	TEXT	CLF DATA SET IDENTITY	R/O	13.14.1
CKA	-	-	DATE	CLOCK TO ADVANCE	MAINT	13.14.3
CKM	-	-	TEXT	GPS CLOCK MONITOR	R/O	13.14.3
CKR	-	-	DATE	CLOCK TO RETARD	MAINT	13.14.3
CKS	-	-	TEXT, 0	LAST GPS CLOCK SYNCHRONISATION	MAINT	13.14.3
CNT	-	0 – 5	0 – 65535	COUNTS USED WHEN GRAPHOS IS ENABLED	MAINT	13.22
COD	-	0 – 2	0 – 2	COPY DETECTORS TO OUTPUTS	MAINT	13.14.1
CON	-	0 – 3	0 – 65535	N + 1 COUNTER VALUE	R/O	13.4
COS	-	-	0 – 3	CAR PARK OCCUPANCY STATUS	R/O	13.12
COU	-	0 – 15	0 – 65535	DETECTOR COUNTER VALUE	R/O	13.4
CPC	-	-	0 – 16383	CAR PARK CAPACITY	MAINT	13.12
CPL	0 – 9	0 – 3	0 – 255	CAR PARK LOOP CONFIGURATION	MAINT	13.12
CPO	-	-	0 – 65535	CAR PARK OCCUPANCY	MAINT	13.12
CPP	-	-	0 – 23	CONTROLLER PHASE PATTERN	R/O	13.3
CPT	0 – 9	0 – 2	0 – 59	CAR PARK TIMETABLE	R/O	13.12
CPS	-	-	BINARY	CAR PARK STATE	R/O	13.12
CRQ	-	0	0 – 1	CALL REQUEST FLAG	R/O	13.7
CSI	-	-	TEXT	CLOCK SYNC FROM INSTATION	R/O	13.14.3
CSO	-	0 – 1	BINARY	CURRENT SWITCH OVERRIDE	R/O	13.17.2
CST	-	-	0 – 15	CONTROLLER STAGE	R/O	13.3
CTN	0 – 2	0 – 11	HEX	CONFIGURED TELEPHONE NUMBERS	R/O	13.7
CTR	0 – 1	0 – 2	0 – 255	CALL TERMINATION RECORD	MAINT	13.7.2
CUS	-	0 – 15	0 – FFF	SIETAG CUSTOMER IDENTITY	MAINT	13.10.3
CYC	-	0 – 15	0 – 255	CYCLE TIME FOR SPECIFIED CLF PLAN	R/O	13.14.1
DBG	-	0	0 – 4	DEBUG OUTPUT ENABLE	MAINT	13.12
DBM	-	-	-	DISPLAY BUS MESSAGES	R/O	13.9
DEA	0 – 7	0 – 7	0 & 1	UTMC OTU DUAL DFM INPUT ENABLE	MAINT	13.20.2
DEI	0 – 7	0 – 7	0 & 1	UTMC OTU SINGLE DFM INPUT ENABLE	MAINT	13.20.2
DFA	-	-	0 – 30	SIETAG DEFAULT ACTION	MAINT	13.10.3
DIP	0 – 3	0 – 5	BINARY	DIGITAL INPUT STATES	R/O	13.4
DOR	-	-	0 – 255	CAR PARK DOOR INPUT	MAINT	13.12
DTA	-	0	2 – 255	UTMC OTU INPUT DFM STUCK ACTIVE TIME	MAINT	13.20.2
DTI	-	0	2 – 255	UTMC OTU INPUT DFM STUCK INACTIVE TIME	MAINT	13.20.2
EBR	-	-	0 – 31	ENG BASE SEGMENT FOR RAM DISPLAY	OPEN	13.8
EEL	-	-	0 – 255	EXAMINE ENHANCED 141 LINK	R/O	13.8
ENR	0 – FFFF	-	ENG	ENGINEERING RAM DISPLAY	R/O	13.8
ERD	-	-	1 & 2	UTMC OTU ECHO & REPEAT DISABLE	OPEN	13.20.3
ERR	-	-	0 - 100	RESTART REPORTS AND DIAGNOSTIC LOGGING IN OPERATIONS LOG	MAINT	13.8

HSET CMD	MAJOR INDEX	MINOR INDEX	DATA	DESCRIPTION	ACCESS	SECT REF
EVA	-	0 – 15	0 – 255	OMCU EVENTS DELAY TIME ACTIVE	R/O	13.17.1
EVI	-	0 – 15	0 – 255	OMCU EVENTS DELAY TIME INACTIVE	R/O	13.17.1
EVS	-	0 – 1	BINARY	OMCU EVENT STATUS	R/O	13.17.1
EXR	-	0 – 1	BINARY	STAGE EXTENSION REQUESTS	R/O	13.3
FCP	-	-	0 – 63	CAR PARK FILL RATE CALCUL' PERIOD	MAINT	13.12
FDC	0 – 1	0 – 8	0 – FFFF	FAULT HAN. DIAGNOSTIC COUNTS	MAINT	13.6.1
FFC	aaa	0 – 15	0 – 15	FAULT FILTER COUNT	R/O	13.6
FFT	-	aaa	TIME	FAULT FILTER TIMER	R/O	13.6
FLG	-	-	-	VIEW TIME STAMPED FAULT LOG	R/O	13.8
FLT	-	-	-	VIEW CURRENT FAULTS	R/O	13.6.2
FOC	-	0 – 15	0 – 65535	FLOW COUNT	R/O	13.15
FOD	-	0 – 15	0 – 65535	FLOW DOWN THRESHOLD	R/O	13.15
FOF	-	0 – 15	0 –100	FLOW SMOOTHING FACTOR	R/O	13.15
FOH	-	0 – 1	BINARY	FLOW HIGH	R/O	13.15
FOL	-	0 – 1	BINARY	FLOW LOW	R/O	13.15
FOP	-	0 – 15	0 – 100	FLOW COUNT PERIOD	R/O	13.15
FOS	-	0 – 15	0 – 65535	SMOOTHED FLOW RESULT	R/O	13.15
FOU	-	0 – 15	0 – 65535	FLOW UP THRESHOLD	R/O	13.15
FTR	-	0 – 3	0 – 255	PSTN FAULT TIMERS	R/O	13.7
FUT	-	0 – 1	0 – 16838	CAR PARK FULL THRESHOLD	MAINT	13.12
GAQ	-	0 – 15	0 – 255	UTMC OTU QUEUE ACTIVE TIME	MAINT	13.20.2
GCD	-	0 – 7	BINARY	UTMC OTU CURRENT RECEIVED DATA	R/O	13.20.3
GCF	-	0 – 15	1 – 8	UTMC OTU COUNT WEIGHTING FACTOR	MAINT	13.20.2
GCN	0 – 15	0 – 7	ASCII	UTMC OTU CONTROL BIT NAMES	R/O	13.20.2
GCT	-	0 – 6	0 – 65535	UTMC OTU COMMS DIAGNOSTICS	R/O	13.20.3
GCU	-	0 – 15	BINARY	UTMC OTU FLOW COUNTER CURRENT VALUE	R/O	13.20.3
GCW	-	0	0 – 8	NUMBER OF UTMC OTU CONTROL WORDS	MAINT	13.20.1
GDO	-	0 – 7	BINARY	UTMC OTU CONTROL BYTE DEFAULT VALUES	MAINT	13.20.5
GDT	-	-	1 – 255	UTMC OTU CONTROL DATA OVERRIDE TIME	MAINT	13.20.5
GEC	-	1 – 23	0 – 1	UTMC OTU ENVIRONMENTAL SENSOR CHANNEL NUMBER	MAINT	13.20.7
GED	-	1 – 23	1 – 1023	UTMC OTU ENVIRONMENTAL SENSOR REPLY DATA VALUE	OPEN	13.20.7
GFR	-	-	4 – 10	FLASH RATE BEING USED ON THE GRAPHOS SIGNS	R/O	13.22
GHA	-	0 – 7	0 – 100	UTMC OTU OCCUPANCY ALARM THRESHOLD	MAINT	13.20.6
GHC	-	-	0 – 100	UTMC OTU OCCUPANCY CLEARANCE THRESHOLD	MAINT	13.20.6
GHF	-	-	0 – 100	UTMC OTU OCCUPANCY SMOOTHING FACTOR	MAINT	13.20.6
GHL	-	0 – 7	0 – 31	UTMC OTU HIOCC INPUT ALLOCATION	MAINT	13.20.6
GHN	-	0 – 7	1 – 10	UTMC OTU CONSECUTIVE OCCUPANCY SAMPLES	MAINT	13.20.6

HSET CMD	MAJOR INDEX	MINOR INDEX	DATA	DESCRIPTION	ACCESS	SECT REF
GHV	-	-	0 – 100	UTMC OTU OCCUPANCY SMOOTHED HIGH VALUE	MAINT	13.20.6
GHZ	-	-	0 – 255	UTMC OTU RESET OCCUPANCY AFTER PRE-SET TIME	MAINT	13.20.6
GIA	0 – 15	0 -1	0 – 143	UTMC OTU COUNT /QUEUE /OCC. I/P ALLOCATION & FUNCTION	MAINT	13.20.2
GID	-	0 – 15	BINARY	UTMC OTU REPLY DATA TEST BYTES	MAINT	13.20.4
GIO	-	-	0 – 3	UTMC OTU REPLY DATA TEST CONTROL	MAINT	13.20.4
GIP	0 - 3	-	0 – 0F	LAST 4 BITS OF THE X4 INPUT ON THE GRAPHOS SIGNS	R/O	13.22
GIQ	-	0 – 15	0 – 255	UTMC OTU QUEUE INACTIVE TIME	MAINT	13.20.2
GIS	-	0 – 7	BINARY	UTMC OTU I/P INVERSION	MAINT	13.20.2
GIU	-	0 -151	ASCII	UTMC OTU INPUT ASSIGNMENT	R/O	13.20.3
GLT	-	-	0 – 143	UTMC OTU ‘LAMP TEST’ INPUT	MAINT	13.20.2
GMD	-	-	0 – 4	GRAPHOS MODE	R/O	13.22
GOD	-	0 – 7	BINARY	UTMC OTU CONTROL BYTE TEST DATA	MAINT	13.20.5
GOE	-	-	0 – 1	UTMC OTU FUNCTION ENABLE	MAINT	13.20.1
GOF	-	0 – 15	1 – 8	UTMC OTU OCC. WEIGHTING FACTOR	MAINT	13.20.2
GOO	-	-	1	UTMC OTU CONTROL DATA TEST	MAINT	13.20.5
GOT	-	-	1 – 255	UTMC OTU DIGITAL OUTPUT OVERRIDE TIME	MAINT	13.20.5
GOU	-	0 – 15	BINARY	UTMC OTU OCCUPANCY COUNTER CURRENT VALUE	R/O	13.20.3
GQU	-	0 – 15	0 – 1	UTMC OTU QUEUE OUTPUT CURRENT STATE	R/O	13.20.3
GRC	-	-	ASCII	GREEN RECORD LOGGING COMMAND	R/O	13.8 & 13.8.6
GRD	-	0 – 15	BINARY	UTMC OTU CURRENT TRANSMIT DATA	R/O	13.20.3
GRL	0 – 15	0 – 7	0 – 255	UTMC OTU REPLY BIT FUNCTION	MAINT	13.20.2
GRN	0 – 15	0 – 7	ASCII	UTMC OTU REPLY BIT NAME	R/O	13.20.2
GRW	-	0	0 – 16	NUMBER OF UTMC OTU REPLY WORDS	MAINT	13.20.1
GSA	-	0 – 23	0 – 151	UTMC SCOOT LOOP TO DIGITAL INPUT MAPPING	MAINT	13.20.2
GSP	0 – 3	-	-	GRAPHOS PICTURE BEING REQUESTED	R/O	13.22
GTC	-	-	0 – 1	UTMC OTU MANUAL CONTROL OF TC	MAINT	13.20.5
GUD	-	0 – 15	0 – 151	UTMC OTU U/D LOOP INPUT MAPPING	MAINT	13.20.2
GUP	-	-	ASCII:ASCII	GPRS USERNAME AND PASSWORD	MAINT	13.13
HIC	-	-	NUMBER	HARDWARE IDENTITY CODE	R/O	13.20.4
IFA	0 – 15	0 – 31	0 – 31	INFLUENCE ACTION NUMBER	R/O	13.14.2
IFN	0 – 15	0 – 31	0 – 3	INFLUENCE FUNCTION	R/O	13.14
INI	-	-	0 – 100	INITIALISE OMCU AND/OR MOVA	MAINT	13.8
IOP	-	0 – 7	BINARY	READ OMCU/INTERNAL PORTS	R/O	13.8.1
IPA	-	0 – 4	NUMBER	IP ADDRESS DETAILS	R/O	13.19
IPB	-	-	ASCII	BOOT SERVER NAME	MAINT	13.19
IPC	-	-	0-65535	IP NETWORK TEST	MAINT	13.20.4

HSET CMD	MAJOR INDEX	MINOR INDEX	DATA	DESCRIPTION	ACCESS	SECT REF
IPI	-	0 – 1	NUMBER: NUMBER	IP ADDRESS OF INSTATION AND PORT NUMBER (OPTIONAL)	MAINT	13.13
IPM	-	0 – 4	NUMBER	OUTSTATION IP ADDRESS CONFIG.	MAINT	13.19
IPP	-	-	NUMBER	PING IP ADDRESS	MAINT	13.20.4
IPR	-	-	1 OR 2	IP RESET	MAINT	13.19
JID	-	-	0 – 9 + SP	JUNCTION IDENTITY	MAINT	13.10.1
KAC	1 – 23	0 – 1	0 – 1023	ANALOGUE DATA	R/O	13.5
KAS	1 – 23	0 – 6	BINARY	LAMP MON. ASPECTS BEING LEARNT	R/O	13.5
KDB	0 – 1	-	0 – 2	DIM/BRIGHT STATE OF CONTROLLER	R/O	13.5
KEY	-	-	16 ASCII	GPRS ENCRYPTION KEY	MAINT	13.13
KIC	-	-	ASCII	OPERATING SYSTEM IDENTITY CODE	R/O	13.20.4
KLS	-	-	BINARY	LAMP MONITORING LEARNING	R/O	13.5
KLM	-	-	6 – 8	LAMPS ON/OFF STATE	R/O	13.5
LAN	-	-	0 – FFF	L. A. N. ADDRESS FILTER	MAINT	13.10.2
LED	0 – 3	0 – 31	0 – FF	STATUS OF THE GRAPHOS LED STRINGS	R/O	13.22
LDV	-	-	0 – 11	LOAD INITIAL DEFAULT VALUES	MAINT	13.10.1
LIC	-	-	NUMBER	MOVA LICENCE NUMBER	MAINT	9.6.5
LIF	-	-	ASCII	LICENCE FACILITY CODE	MAINT	13.19
LIN	-	-	NUMBER	LICENCE CODE NUMBER	MAINT	13.19
LIP	-	0 – 7	BINARY	LOGICAL INPUTS	R/O	13.4
LMD	-	-	0 – 3	MASTER LSCU MODE	R/O	13.22
LMO	-	-	0 – 1	LAMP MONITOR OVERRIDE	MAINT	13.5
LMR	0 – 1	-	0 – 1	LAMP MONITOR RESET/R-LEARN	MAINT	13.5
LOC	-	-	ASCII	OUTSTATION LOCATION	R/O	13.19
LSO	0 – 3	-	0 – 100	BRIGHTNESS OF THE GRAPHOS LEDS	R/O	13.22
LTS	-	-	0 – 255	MODEM LOOPBACK TEST	R/O	13.8
MAC	-	-	NUMBER	ETHERNET MAC ADDRESS	R/O	13.19
MAP	-	0 – 9	0 – 7	PRIORITY MAP (TfL BUS ONLY)	MAINT	13.10.2
MCI	-	0 – 1	ENG	MODEM CONTROL INDICATORS	R/O	13.7.3
MDC	0 – 1	0 – 12	0 – FFFF	MESS. HAN. DIAGNOSTIC COUNTS	MAINT	13.7.4
MDE	-	-	0 – 255	CONTROLLER MODE	R/O	13.3
MIO	-	-	0 – 2	MOVA I/O SETTING	MAINT	9.6.4
MON	-	aaa	ON/OFF	MONITORING ON/OFF	R/O	13.3
MOS	-	-	ASCII	USER DEFINED MODEM CONFIG STRING	MAINT	13.7
MPC	-	-	0-1	MODEM POWER CYCLE	MAINT	13.7.5
MSI	-	0 – 2	BINARY	MAINS STATE INPUTS	R/O	13.4
MTS	-	0 – 31	-	MONITOR CLF STATUS	R/O	13.14.1
OCC	-	0 – 15	0 – 65535	OCCUPANCY COUNT	R/O	13.16
OCD	-	0 – 15	0 – 100	OCCUPANCY DOWN THRESHOLD	R/O	13.16
OCF	-	0 – 15	0 – 100	OCCUPANCY SMOOTHING FACTOR	R/O	13.16
OCH	-	0 – 1	BINARY	OCCUPANCY HIGH	R/O	13.16
OCL	-	0 – 1	BINARY	OCCUPANCY LOW	R/O	13.16
OCP	-	0 – 15	0 – 100	OCCUPANCY COUNT PERIOD	R/O	13.16
OCS	-	0 – 15	0 – 100	SMOOTHED OCCUPANCY RESULT	R/O	13.16
OCU	-	0 – 15	0 – 100	OCCUPANCY UP THRESHOLD	R/O	13.16

HSET CMD	MAJOR INDEX	MINOR INDEX	DATA	DESCRIPTION	ACCESS	SECT REF
OFF	0 – 15	0 – 1	0 – 255	CLF OFFSET FROM THE BASE TIME	R/O	13.14.2
OID	-	-	ASCII	OUTSTATION ID STRING	MAINT	13.19
OLG	-	-	-	OPERATIONS LOG	R/O	13.8.7, 13.9, 13.18.3
OPM	-	-	0 – 5	OMCU OPERATING MODE	R/O	13.8.2
OPS	0 – 2	-	BINARY	OUTPUT SENSE	MAINT	13.14.1
PDL	-	0 – 1	BINARY	LATCHED PHASE DEMANDS	R/O	13.3
PDR	-	0 – 1	BINARY	REVERTIVE PHASE DEMANDS	R/O	13.3
PDU	-	0 – 1	BINARY	UN-LATCHED PHASE DEMANDS	R/O	13.3
PGS	-	0 – 1	BINARY	PHASE GREEN STATES	R/O	13.5
PIA	-	-	0 – 2	PLANS ISOLATE ACTION	R/O	13.14.2
PIC	-	-	-	PROGRAM IDENTITY CODE	R/O	13.8
PLE	-	0 – 15	0 – 255	PLAN ENTRY TIME	R/O	13.14.2
PLI	-	0 – 15	0 – 15	PLAN INFLUENCE SET	R/O	13.14.2
PLS	-	-	0 – 1	MOVA PHONE LINE SHARING FACILITY	MAINT	9.6.3
PLT	0 – 15	0 – 31	0 – 255	PLAN TIME FOR SPECIFIED CLF PLAN	R/O	13.14.2
PLX	-	0 – 15	0 – 255	PLAN EXIT TIME	R/O	13.14.2
PME	-	-	0 -255	LEVEL 2 (MAINT) ACCESS CONTROL	OPEN	-
POC	0 – 11	0 – 4	VARIOUS	RS485 PORT CONFIGURATIONS	MAINT	13.10.1
POS	-	-	0 – 1	SET RS485 PORT SETTING	MAINT	13.10.1
PPD	-	-	0 – 1	GPRS DEBUG ENABLE	MAINT	13.13
PRI	-	0 – 1	1 – 3	RTIG PRIORITY OUTPUT LINES	MAINT	13.10.4
PUD	-	0 – 5	0 – 255	POWER UP DATA	MAINT	13.8.3
PTO	-	-	NUMBER	PPP LINK TIMEOUT (SECONDS)	MAINT	13.13
RAM	-	-	256, 1024	NUMBER OF KB OF RAM INSTALLED	R/O	13.8
RAT	-	-	1	NON-DESTRUCTIVE RAM TEST	MAINT	13.20.4
RCA	-	-	ASCII	REMOTE COMMS USER ADDRESS	MAINT	13.13
RCB	-	-	0 – 4	REMOTE COMMS BAUD RATE	MAINT	13.13
RCD	-	-	0 – 255	RADIO CLOCK FAULT DELAY	MAINT	13.10.1
RCI	-	-	0 – 255	RADIO CLOCK INPUT	MAINT	13.10.1
RCM	-	-	-	RTIG COMMS MONITOR	R/O	13.10.4
RCR	-	-	0 – 2	RADIO CLOCK FAULT REPORTING	MAINT	13.10.1
RCS	-	-	-	RADIO CLOCK SIGNAL	R/O	13.8.5
RCT	-	-	0 – 6	REMOTE COMMS TYPE	MAINT	13.13
RCU	-	-	0 – 1	REMOTE COMMS UPDATE	MAINT	13.13
RDF	-	-	0 – 1	RESET CAR PARK DETECTOR FAULTS	MAINT	13.13
RET	-	-	0 – 300	REACTIVATION TIME	MAINT	13.10.1
RIC	-	-	-	DISPLAY REDBOOT VERSION NO	R/O	13.8
RIF	-	-	0 – FF	RETRY INHIBIT FLAG	R/O	13.7
RFL	-	-	1	CLEARS THE UTMC OTU FAULT LOG	MAINT	13.20.4
RMD	-	-	0 – 9	RTIG MESSAGE DELAY	MAINT	13.9
RMP	-	0 – 3	0 – 63	CAR PARK RAMP MODE SETTINGS	MAINT	13.12
RMS	-	-	-	RESERVED	R/O	-
RPL	-	-	0 – 15, 255	REQUESTED CLF PLAN	MAINT	13.14.1
RPM	0 – 31	0 – 2	0 – 255	RTIG PRIORITY MAP	MAINT	13.10.4

HSET CMD	MAJOR INDEX	MINOR INDEX	DATA	DESCRIPTION	ACCESS	SECT REF
RSA	-	0 – 31	0 – 31	RELATED STREAM FOR ACTION	R/O	13.14.2
RSC	-	-	0 – 255	RETRY STEP COUNTER	R/O	13.7
RTO	-	-	0 – 255	REAL TIME CLOCK (5AM) OUTPUT	MAINT	13.10.1
RTR	-	0 – 2	0 – 255	RETRY TIMER	R/O	13.7
SCT	-	-	0 – 7	SET 0141 CONTROLLER TYPE	MAINT	13.8
SDC	-	A – P	0 – FFFF	SDE/SA EXTENSION REQUESTS	R/O	13.3
SDF	-	-	0 – 1	SPEED DISPLAY FORMAT	MAINT	13.18.1.8
SEB	-	0 – 3	0 – FFFF	SOFT ERROR BUFFER	R/O	13.8.4
SEC	-	-	0 – 255	SOFT ERROR CURRENT COUNT	R/O	13.8
SES	0 – 9	0- 1	0 – FFFF	SOFT ERROR STATUS	R/O	13.8
SGM	0 – 4	-	0 – 4	GRAPHOS SET COMMAND	MAINT	13.22
SIP	0 – 9	0 – 9	0 – 65535	SIMULATE INPUT	MAINT	13.20.8
SMS	-	-	ASCII	STAGE MONITOR STATUS	R/O	13.3
SOB	-	-	ENG	SET OUTPUT BITS	MAINT	13.8
SOP	0 – 3	-	BINARY	SET OUTPUT PORT	MAINT	13.8
SRC	-	0 – 15	0 – 255	BUS MESSAGE SOURCE	MAINT	13.10.1
STP	-	-	0 – 63	SET THROUGH PORT CONFIGURATION	MAINT	13.8
SWS	-	0 – 31	0 – 1	TIMESWITCH SETTINGS	R/O	13.14.1
TAF	-	-	1 – 3	SIETAG TAG FORMAT	MAINT	13.10.3
TAI	-	-	0 – 255	TAG INTERVAL	MAINT	13.10.3
TCA	-	-	0 – 47	UTMC OUT TC OUTPUT ALLOCATION	MAINT	13.20.2
TDY	-	0 – 15	TEXT	TIMETABLE DAY	R/O	13.14.2
TIM	CLR	-	0 – 1	CLEAR ALL TIMES VALUES	MAINT	13.3
TIM	EXL	0 – 15	0 – 255	LONGEST TIMED EXTENSION	MAINT	13.3
TIM	EXS	0 – 15	0 – 255	SHORTEST TIMED EXTENSION	MAINT	13.3
TIM	IGN	PH – PH	0 – 255	SHORTEST TIMED INTERGREEN	MAINT	13.3
TIM	MAX	0 – 15	0 – 255	LONGEST TIMED MAX GREEN	MAINT	13.3
TIM	MIN	0 – 15	0 – FF	SHORTEST TIMED MIN GREEN	MAINT	13.3
TMP	-	1 – 64	0 – 1	TEMP CONDITIONING FLAGS	MAINT	13.8
TNP	-	-	0 – 2	TELEPHONE NUMBER POINTER	R/O	13.7
TOD	-	-	TIME	TIME OF DAY	MAINT	13.8
TSD	-	0 – 63	DATE and 0 – 99	TIMETABLE SPECIAL DAY	R/O	13.14.2
TSH	0 – 31	0 – 1	DATE	TIMETABLE SPECIAL HOLIDAY	R/O	13.14.2
TSN	-	-	0 - 16383	TRAFFIC SIGNAL NUMBER	MAINT	13.10.4
TSW	0 – 63	0 – 5	0 – 215	TIME SWITCH SETTINGS	R/O	13.14.2
TWD	-	-	1	TRIP THE WATCHDOG	MAINT	13.14
VCC	-	0 – 4	0 – 255	VEHICLE CLASSIFIER COMMON CONFIGURATION	R/O	13.18.1
VCF	-	0 – 2	0 – 255	VEHICLE CLASSIFIER CONFIRMATION FAIL PARAMETERS	R/O	13.18.1.4
VDE	-	0 – 1	0 – FFFF	VEHICLE CLASSIFIER DETECT CONDITION EVENT LOGGING	R/O	13.18.1.11
VLC	0 – 31	0 – 1	0 – 255	VEHICLE CLASSIFIER LOOP CONFIGURATION	R/O	13.18.1.1
VMA	-	0 – 7	1 – 254	UTMC VMS SIGN RS485 ADDRESS	MAINT	13.21.2
VMC	0 – 15	0 – 3	0 – FFFF	VARI-MAX LOG	R/O	13.3
VMD	-	-	1 – 240	UTMC VMS OUTSTATION POLL DELAY	MAINT	13.21.1

HSET CMD	MAJOR INDEX	MINOR INDEX	DATA	DESCRIPTION	ACCESS	SECT REF
VMH	-	0 – 7	1 – 6	UTMC VMS SIGN HEIGHT (NUMBER OF ROWS)	MAINT	13.21.2
VML	-	0 – 7	1 OR 2	UTMC VMS SIGN LANTERN CONFIGURATION	MAINT	13.21.2
VMM	0 – 7	0 – 5	ASCII	UTMC VMS SIGN ROW DISPLAY MESSAGE	R/O	13.21.2
VMN	-	0 – 7	0 – 11	UTMC VMS SIGN TO OUTSTATION RS485 PORT ALLOCATION	MAINT	13.21.2
VMP	-	-	ASCII	UTMC VMS OUTSTATION ‘PASSWORD’ FOR REMOTE ACCESS	MAINT	13.21.1
VMS	-	-	0 – 7	UTMC VMS SIGN ENABLE	MAINT	13.21.1
VMT	-	0 – 7	ASCII	UTMC VMS SIGN DESCRIPTION	MAINT	13.21.2
VMV	-	0 – 7	0 OR 1	UTMC VMS SIGN TEST	MAINT	13.21.2
VMW	-	0 – 7	1 – 100	UTMC VMS SIGN WIDTH (NUMBER OF CHARACTERS IN EACH ROW)	MAINT	13.21.2
VOA	0 – 31	0 – 6	0 – 255	VEHICLE CLASSIFIER OUTPUT ACTION LIST	R/O	13.18.1.2
VRC	-	-	0 – 65535	VEHICLE CLASSIFIER TEST MESSAGE COUNT	MAINT	13.18.1.10
VRX	-	0 – 5	0 – 255	VEHICLE CLASSIFIER TEST MESSAGE	MAINT	13.18.1.10
VSB	-	0 – 6	0 – 255	VEHICLE CLASSIFIER SPEED BANDS	R/O	13.18.1.7
VSM	-	0 – 31	0 – 15	VEHICLE CLASSIFIER DETECT CONDITION STATISTIC CATEGORY MAP	R/O	13.18.1.12
VSP	0 – 3	0 – 5	0 – 255	VEHICLE CLASSIFIER SITE PARAMETERS	R/O	13.18.1.3
VTD	-	0 – 2	0 – 60	VEHICLE CLASSIFIER TRAFFIC DATA PARAMETERS	R/O	13.18.1.6
VTM	0 – 4	0 – 1	TEXT	VEHICLE CLASSIFIER TRANSMISSION MESSAGES	R/O	13.18.1.7
VVT	0 – 15	0 – 1	TEXT, 0 – 255	VEHICLE CLASSIFIER VEHICLE TYPE CATEGORIES	R/O	13.18.1.9
XXC	-	-	-	SWITCH H/SET TO 141 CONTROLLER	OPEN	13.8
XXM	-	-	-	SWITCH H/SET TO MOVA	OPEN	13.8
XXO	-	-	-	SWITCH HANDSET TO Outstation	OPEN	13.8
XIP	-	-	BINARY	EXTERNAL INPUTS STATES	R/O	13.4

13.1.1 Command Format

All operator commands start with a three-letter command code indicating the parameter to be monitored or changed. This code may constitute the complete command, e.g. **KDB** for controller ‘DIM/BRIGHT’ state, or may be followed by one or two indices indicating a specific parameter within the category determined by the code. For example, analogue data of specified input **KAC** requires identifying both the channel and the voltage or current on that ADC channel.

For read operations, following typing of the command code and any indices if applicable, operation of the ENTER (or ‘RETURN’) key terminates the command.
For write operations an equals sign ‘=’ followed by the parameter required is added to the read command before selecting ENTER (or ‘RETURN’). Thus, for example:

- To read the analogue data the command is:

`KAC 1 0` followed by ENTER or RETURN
<Command Code> <Channel Number> <Voltage or Current Selection>

- To reset the Power-up statistics data (first element of six) the command is:

`PUD 0 = 0` followed by ENTER or RETURN
<Minor Index (first element> <Write Data Label> <New Data>

The '+' (or '.+') and '-' (or '.-') keys may be used after a basic read command has been entered to enable the MINOR index (or MAJOR index) to be modified to scan the Outstation.

13.1.2 Display Format

The two basic display formats are:

- Echo display that is simply an echo of the information typed.
- Response display generated by the Outstation when the command is terminated by operating the ENTER (or 'RETURN') key or the '+' (or '.+') keys.

The response displays include:

- Read response display comprising a repeat of the command with spaces between the fields and a colon and data added, e.g.
  `PUD 0:0`
- Write response display in which the command is repeated with the '=' replaced with a colon, i.e. identical to the corresponding read response display.
- Error response display in which the command is repeated with an asterisk and error code added, e.g.
  `PUD AB*S`

Indicating the command has a syntax error and should be repeated correctly.

Other display formats comprise those without the command repeated due to lack of display character width; e.g. response to monitor digital inputs command DIP. Where the command deviates from the normal in either of these respects this is indicated in the command table.

13.1.3 Read Procedure (Monitor Existing Data)

1. Plug the handset into the socket on front of the Outstation.
2. When the Outstation displays the prompt character '-', type out the appropriate command and any index necessary, e.g. to determine the DIM/BRIGHT state of the controllers signal lamps enter KDB to produce the display:
   KDB

3. Terminate the command by operating the ENTER (or 'RETURN') key. The Outstation responds by repeating the display with a colon and the required data. (e.g. Bright state in this example), i.e. KDB: 1
4. Repeat Steps 2 and 3 for each operation using the '+' (or '.+') or '-' (or '.-') keys where possible to reduce key entry.

NOTE: If the Outstation detects an error on interrogating the command, instead of the normal response, the Outstation repeats the command display with an asterisk and error code added. The error codes used are listed in Table 13.2.

13.1.4 Write Procedure (Change Existing Data)

1. Plug the handset into the socket on front of the Outstation.
2. When the Outstation displays the prompt character '-', carry out the appropriate level access enabling operation (described in information supplied separately to each Outstation user).

   Type out the required command code, any index or indexes necessary, followed by '=' and the required value, e.g. to reset the Power Up state data (second element), enter 'PUD 1=0' which will be echoed back to the handset
3. Plug the handset into the socket on front of the Outstation.
4. When the Outstation displays the prompt character '-', carry out the appropriate level access enabling operation (described in information supplied separately to each Outstation user).

   Type out the required command code, any index or indexes necessary, followed by '=' and the required value, e.g. to reset the Power Up state data (second element), enter 'PUD 1=0' which will be echoed back to the handset
5. Terminate the command by operating the ENTER (or 'RETURN') key. The Outstation responds to confirm the change by repeating the display with = changed to colon as shown below:

   ```
   PUD 1:0
   ```
6. Repeat step 3 and 4 for each operation using the '+' (or '.+') or '-' (or '.-') key where possible to reduce key entry.

NOTE: If the Outstation detects an error on interrogating the command instead of the normal display an error display comprising the command display with an asterisk and error code added. The error codes used are listed in Table 13.2.

13.1.5 Alternative Write Procedure (Change Data Following Read)

With access enabled as appropriate, a write procedure may be carried out following reading of the information to be changed by typing = followed by the new value. This immediately replaces the colon and the old value in the display. On operation of the ENTER (or 'RETURN') key to terminate the instruction, the Outstation repeats the display with = replace by a colon.

13.1.6 Switchable Handset Facility

It is possible to store up to 10 handset commands, such that any of these commands may be subsequently recalled by pressing the "." (dot) key, followed by the appropriate number. In this way it is possible to simply switch between one handset display and another. (See note)

Setting Up

Assume that the following controller data/status information is being studied:

(a) Detector Inputs
(b) Phase Green States
(c) Current Stage

The following would be entered:

(the Outstation will respond '__:' (prompt) at this position if the command pointer was peviously empty)

[.0] [DIP 0]

Command Pointer

Command to look at state of Digital Inputs (i.e first port on board 0)

[.1] [PGS O] followed by ENTER or RETURN

Command Pointer

Command to look at state of Phase Greens

[.2] [CST] followed by ENTER or RETURN

Command Pointer

Command to look at the controller's current stage

The 3 command pointer .0, .1 & .2 have now been set.

Using The Facility

The handset can now be used to invoke the previous commands by simply entering a '.' (dot) followed by 0, 1 or 2, e.g.

.1 will display the status for Phases A to H.
.2 will indicate the current stage.
.0 will display the current status for input port 0, board 0.
.1 will display the status for Phases A to H again.
\+ will now display the status for Phases I to 0 and will be remembered as the new command for '.1'
.0 will display input port 0 again.
.1 will display the status for Phases I to O.

The facility is not restricted to just the commands indicated above; any valid handset facility may be entered in any of the pointers in any order.

Note: On some handset commands it is not advisable to duplicate the command in two or more dot buffers. If this is done then access to the other duplicate command buffers will not be serviced. The commands affected are identified in the mnemonic code box.

13.2 HANDSET COMMAND ERROR CODES

Code	Name	Description/Mnemonic
A	Access Level	Access level for this command has not been enabled. Use PME.
C	Non-configured	The facility to which the command relates is not available
D	Data Integrity	The data cannot be set to the specified value. Data associated with other handset command must be modified before this command can be set to the specified value.
F	Fixed Base	The ‘+’ or ‘-‘ keys are not applicable to current command.
I	Inaccessible	The facility to which this command relates is not accessible.
M	Mnemonic not recognised	The command mnemonic is not known. The command may require a later issue of firmware.
P	Premature end of command line	The <enter> key has been pressed too soon for this command. Re-enter, with additional data.
R	Range error	Data or index value in preceding command out of range.
S	Syntax error	Invalid character at point preceding the asterisk.
V	Invalid current address	The <enter>, ‘=’, ‘+’ or ‘-‘ keys have been attempted on invalid command data.
W	Write protected	Attempt to modify read only data.

13.3 CONTROLLER MONITORING COMMAND TABLE

Code	Major Index	Minor Index	Data Range	Description	Access Level
AEC	-	-	-	**Accumulated Error Counts Display** (Total for unfiltered timing errors – see FFC command for individual errors making up this total)	RO
AMX	-	-	-	**Display alternative Maximum Set Number** Data 0 – normal MAX, 1,2 & 3 – Alternative MAX sets	RO
CPP	-	-	-	**Display controller Phase pattern** Data: 0 to 23 as defined in the OMCU configuration data for Phase pattern definition	RO
CST	-	-	-	**Display Controller Stage** Data: 0 to 15 for a valid stage, 255 for an unknown stage or inter-stage	RO
EXR	-	0-1	-	**Display Stage Extension Requests** Minor Index: 0 – stages 0 to 7 Minor Index:1 – stages 8 to 15 Data: 8 Bit binary	RO
MDE	-	-	-	**Display Controller Mode** Data: (See section 13.6.11 for mode numbers)	RO
MON	-	CFL	-	**Phase Conflict Monitoring** Data: (ON/OFF)	RO
MON	-	EXT	-	**Green Extension Monitoring** Data: (ON/OFF)	RO
MON	-	IDM	-	**Ignoring Demands Monitoring** Data: (ON/OFF)	RO
MON	-	IGN	-	**Inter-green Monitoring** Data: (ON/OFF)	RO
MON	-	LAR	-	**Long All-Red monitoring** Data: (ON/OFF)	RO
MON	-	LIS	-	**Long Inter-Stage monitoring** DATA: (ON/OFF)	RO
MON	-	MAX	-	**Maximum Green monitoring** DATA (ON/OFF)	RO
MON	-	MIN	-	**Minimum Green monitoring** DATA: (ON/OFF)	RO
MON	-	SDE	-	**SDE/SA monitoring** DATA: (ON/OFF)	RO

Code	Major Index	Minor Index	Data Range	Description	Access Level
MON	-	SEQ	-	**Stage Sequence monitoring** DATA: (ON/OFF)	RO
MON	-	STK	-	**Controller Stuck monitoring** DATA: (ON/OFF)	RO
MON	-	VMX	-	**Vari-Max monitoring** DATA: (ON/OFF)	RO
PDL	-	0 – 1	-	**Display Phase Demands – Latched** MINOR INDEX: 0 – Phases A to H MINOR INDEX: 1 – Phases I to P DATA : 8 BIT BINARY	RO
PDR	-	0 – 1	-	**Display Phase Demand – Revertive** MINOR INDEX 0 – Phases A to H 1 – Phases I to P DATA: 8 Bit Binary	RO
PDU	-	0 – 1	-	**Display Phase Demands Unlatched** MINOR INDEX: 0 – Phases A to H 1 – Phases I to P DATA: 8 Bit Binary	RO
SDC	-	**1 A – P	-	**Display SDE/SA Extension request for each phase**. MINOR INDEX: PHASE. DATA: 0 to FFFFH	RO
SMS	-	-	-	**Stage Monitoring Status** DATA: Controller timing period.	RO
TIM	-	CLR	-	**Clear ALL measured controller timings.** (Enter 1 ; OMCU responds with 0 when actioned)	WO
TIM	**3 EXL	**2 0 – 15	-	**Display/Reset shortest measured extension time for each stage.** MINOR INDEX: STAGE DATA: Longest Extension in seconds and tenths of a second.	RW
TIM	**3 EXS	**2 0 – 15	-	**Display/Reset shortest measured extension time for each stage** MINOR INDEX: STAGE DATA: Shortest Extension in seconds and tenths of a second.	RW

Code	Major Index	Minor Index	Data Range	Description	Access Level
TIM	**3 IGN	**1 PH – PH	-	**Display/Reset shortest measured inter-green time for each phase to phase movement** MINOR INDEX: PHASE to PHASE. DATA: Shortest Inter-green in seconds and tenths of seconds. (use + to inc from phase)	RW
TIM	**3 MAX	**2 0 – 15	-	**Display /Reset longest measured maximum time for each stage** MINOR INDEX: STAGE DATA: Longest MAX in seconds and tenths of seconds	RW
TIM	**3 MIN	**2 0 – 15	-	**Display Reset shortest measured minimum time for each stage** MINOR INDEX: STAGE DATA" shortest Min in seconds and tenth of seconds	RO
VMC	0 – 15	**2 0 – 3	-	**Display Vari – Max log** Major index: Related Stage Minor index: Vari – Max Band Data Range: 0 to FFFF Each Vari-Max stage is specially monitored to count the number of times the MAX GREEN terminates after the normal MAX period. These counts are stored in the bands 0 to 3 for each configured Vari-Max stage.	RO

Note **1 - Dependant upon the maximum number of PHASES configured.
Note **2 - Dependant upon the maximum number of STAGES configured
Note **3 - Command should be terminated (by <enter> or <carriage return>) after the major index has been entered, and the + & - keys used to access the appropriate data. The Outstation will automatically insert the minor index info.

The SMS command provides additional information on OMU timing monitoring. As the controller cycles through its stages, the SMS command will display a sequence of messages to show which timing period is being monitored (min, extension or max) at each point by the OMU.

SMS: INACTIVE	Timing monitoring not active
SMS: INTER STG	Inter-stage period active
SMS: MIN ACTIVE	Stage minimum timing period active

SMS: MIN END	Stage minimum completed
SMS: EXT MONITR	Stage extension timing active
SMS: MAX END	Stage max time terminating
SMS: AWAIT END	Timing monitoring for the stage has completed, waiting for end of stage
SMS: SHORT MIN	Min time was below the defined limit
SMS: SHORT EXT	Extension time was below the defined limit
SMS: LONG EXT	Extension time was above the defined limit
SMS: LONG MAX	The max time was above the defined limit

13.4 INPUT MONITORING COMMAND TABLE

Code	Major Index	Minor Index	Data Range	Description	Access Level
CCU*	0 – 1	0 – 7	-	**Display Call/Cancel timers** Major index : 0 = Call time; 1 = Cancel time Minor index : Call/Cancel unit DATA: Time (in seconds)	RO
CON	-	0 – 3	0 – 65535	**Display N+1 COUNTER VALUES** Minor index: N+1 unit DATA: Count value	RO
COU	-	0 – 15	0 – 65535	**Display Detector Counter values** Minor index: Counter number DATA: Count value	RO
DIP	0 – 3 board no.	0 – 5 port no.	00000000 to 11111111	Display digital inputs in binary, for the selected board and port number. Not all ports may be equipped. Board 0 = 1st I/O card Board 1 = 2nd I/O card Board 2 = 3rd I/O card Board 3 = CPU card e.g. DIP 0 0 displays board 0 input port 0, DIP 2 1 displays board 2 input port 1.	RO
LIP	-	0 – 7	00000000 to 11111111	**Display Logical Input Ports** (See Section 13.4.1 for details)	RO

MSI	-	0 – 2	-	**Display Mains state inputs.** Minor index: **MSI 0** - first 8 mains I/Ps on first I/O Board or the two mains state I/Ps on the PSU connector if **NO** LMU I/O card fitted (MSI 0:000000xx). **MSI 1** - last 2 mains I/Ps on first I/O Board & first 6 mains I/Ps on 2nd I/O Board **MSI 2** - last 4 mains I/Ps on 2nd I/O Board & first 4 mains I/Ps on 3rd I/O Board. DATA: 8 Bit Binary (bit7 - input bit 7 etc)	RO
XIP*	-	-	-	**Display External Input states.** DATA: 8 Bit Binary (bit7 – input bit 7 etc)	RO

***** Only valid if monitoring is on.

13.4.1 <u>Outstation Logical Input Ports (LIP)</u>

Displays the logical port data i.e. after it has been copied from either the OMU hardware inputs (freestanding OMU) or from the ST800/700 inputs (semi-integral OMU with enhanced serial link to ST800/700).

The port data is displayed after any configured inversions on the inputs.

The port number only counts input ports on the controller (output ports are skipped).

FORMAT: LIP <n>

Where <n> is the minor index (0 – 7) and results in the following:

LIP Port	**ST800/700 I/P Port**
`LIP 0`	0 – CPU card
`LIP 1`	1 – CPU card
`LIP 2`	2 – 1st I/O card
`LIP 3`	3 – 1st I/O card
	(Ports 4 and 5 are output ports and are skipped)
`LIP 4`	6 – 2nd I/O card
`LIP 5`	7 – 2nd I/O card

13.5 LAMP MONITORING COMMAND TABLE

Code	Major Index	Minor Index	Data Range	Description	Access Level
LMO	-	-	0 – 1	**Lamp monitor override** Enter 1; Lamp monitor override enabled, allowing OMCU to monitor lamps while using enhanced serial link. Enter 0; Lamp monitor override disabled.	Maint
LMR	-	-	-	**Lamp monitor RESET/RELEARN** (enter 1; OMCU responds with 0 when command accepted)	Maint
PGS	-	0 -1	-	**Display state of Phase Greens** minor index : 0 – phases A to H 1 – phases I to P Data: 8 Bit Binary Each bit represents a phase i.e. HGFEDCBA or PONMLKJI as defined by the minor index	RO
KAC	1 – 23 sensor number	0 – 1 0=curr 1=lamp supply voltage	-	**Display Lamp Monitor ADC readings** Even if the OMCU is unconfigured, the ADC values for all sensors are made available. This allows checking of the currents and voltages prior to OMCU configuration download. Typically ‘bright’ values are:- 40Watt lamp ⇒ KAC n 0:35 50Watt lamp ⇒ KAC n 0:44 230V lamp supply ⇒ KAC n 1:720	RO
KLS	-	-	-	**Display OMCU Learn Status** KLS <enter> Comment: Displays the combined learn status bits for all aspects of all configured sensors. Refer to KAS command following for bits 0 to 3, for the status bit definitions and layout. Only bits 0 to 3 are displayed, bits 4 to 7 are always 0.	RO
KAS	1 – 23 sensor number	0 – 6 aspect pattern number	BINARY *NOTE1	**Display LMU Aspect Learn Status** Aspect pattern 0=red, 1=green or wait and 2=amber	RO

Code	Major Index	Minor Index	Data Range	Description	Access Level
KDB	0 – 1	-	0 – 2	**Display Controller Dim/Bright State** KDB (lamp supply:0 – 1)<enter> Comment: Indicates the dim/bright state for each of the controller lamp supplies as shown below:- 0 – state undefined (no change has occurred) 1 – dim 2 – bright	RO
KLM	0	-	6 – 8	**Display Lamps ON/OFF State** KLM (lamp supply: 0 – 1) <enter> Comment: Indicates the state for each of the controller lamp supplies as shown below:- 6 – lamps off 7 – lamps on 8 – change in progress (debounce period)	RO

NOTE 1:

The meaning of each bit in the KAS binary display is listed below:

Bit 0 – AWAIT_DIM – Aspect not yet appeared in DIM
Set if current ‘dim/bright’ state is known to be bright and AWAIT_DIM_CHANGE is set.
Cleared when ‘dim/bright’ state is dim and AWAIT_DIM_CHANGE is clear
Bit1 – AWAIT_BRIGHT – Aspect not yet appeared in BRIGHT
Set if current ‘dim/bright’ state is known to be dim and AWAIT_DIM_CHANGE is set.
Cleared when ‘dim/bright’ state is bright and AWAIT_DIM_CHANGE is clear.
Note: Under certain conditions both AWAIT_DIM and AWAIT_BRIGHT bits can be set for an aspect. If this occurs neither bit will be cleared until the LMU has learnt the aspect in both dim and bright states.
Bit 2 – AWAIT_ASPECT – Aspect not yet appeared
Set on LMU initialisation. Cleared when aspect first learnt
Bit 3 – AWAIT_DIM_CHANGE – First dim/bright change assessment enabled
Set on LMU initialisation if dim/bright changeover monitoring is enabled.
Cleared after first dim/bright change assessment for the aspect has been completed
Bit 4 – CONF_LOAD – Aspect being assessed for load change
Set when either the ‘rise’ or ‘fall’ change counters are non-zero.
Bit 5 – CONF_DIM –Aspect being assessed for dim change counter is non-zero.
Cleared when both the ‘dim’ and ‘bright’ change counters are zero
Bits 6 & 7 – Not used.

13.6 FAULT DATA COMMAND TABLE

Code	Major Index	Minor Index	Data Range	Description	Access Level
FDC	0 – 8	0 – 1	-	**Display Fault Diagnostics** See 13.6.1	RW
FFC	EXL	0 – 15 (**2)	-	**Display LONG EXTENSION fault** Filter count for each stage. Minor Index: stage Data: Fault Filter Count	RO
FFC	EXS	0 –15 (**2)	-	**Display SHORT EXTENSION** fault filter count for each stage. Minor Index: Stage Data: Fault Filter Count	RO
FFC	IDM	A – P (**1)	-	**Display IGNORING DEMAND fault** filter count for each stage. Minor Index: Stage Data: Fault Filter Count	RO
FFC	IGN	PH – PH (**1)	-	**Display INTER – GREEN fault** filter count for each phase. Minor Index: Phase to Phase Data: Fault Filter Count	RO
FFC	MAX	0 – 15 (**2)	-	**Display LONG MAX GREEN fault** filter count for each stage Minor Index: Stage Data: Fault Filter Count	RO
FFC	MIN	0 – 15 (**2)		**Display SHORT MIN GREEN fault filter** count for each stage Minor Index: Stage Data: Fault Filter Count	RO
FFT	-	EXL	-	**Display LONG EXTENSION fault** filter timer. Data: Time (hours-minutes).	RO
FFT	-	EXS	-	**Display SHORT EXTENSION fault** filter timer. Data: Time (hours-minutes).	RO
FFT	-	IGM	-	**Display INTERGREEN fault** filter timer Data: Time (hours-minutes).	RO
FFT	-	MAX	-	**Display LONG MAX fault** filter timer. Data: Time (hours-minutes).	RO
FFT	-	MIN		**Display SHORT MIN fault** filter timer. Data: Time (hours-minutes).	RO

Code	Major Index	Minor Index	Data Range	Description	Access Level
FLT (3)**	-	-	-	**View current Fault List** Selects first non-zero entry (see section 13.6.2 for details)	RO

NOTE: **1 – Dependant on number of PHASES configured
**2 – Dependant on number of STAGES configured
3 – Restricted use of the ‘.**’ (dot) command

13.6.1 Fault Diagnostics (FDC)

This handset command allows access to general fault monitoring statistics.

This data is arranged in two sets accessed by the major and minor Indices:
Minor Index : 0 - Current information
Minor Index : 1 - Historic information

As each condition occurs the relevant count is incremented and when the number of characters received reaches its maximum value (FFFFH) then all counts are copied to the ‘historic log’ (minor index = 1) and then resets to zero.

When the Outstation is first installed all the data is reset to 0.

Note: All count information is displayed in HEX

FORMAT: **FDC** <**m**> <**n**>

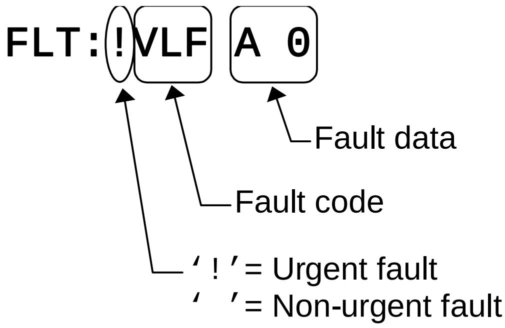
Here <m> is the ‘major index’ and <n> is the ‘minor index’.

Major Index:
0 Number of reports entered into Outstation Fault Log.
1 Number of reports entered into the List area following a FLT Handset request.
2 Total number of reports generated.
3 Number of Dial requests made to the Instation.
4 Number of Fault Log Buffer overflows (due to too many unreported faults).
5 Number of Fault Log timer overflows (due to long periods of time between faults).
6 Number of Fault Log resets received
7 Number of Fault Log resets received for unreported faults.
8 Number of times Fault Log has been read

If the maintenance access code has been entered the log data may be reset by entering ‘=0”.

13.6.2 General Fault Data Display Format

The **FLT** command displays a list of current faults (use + and – to scroll through the list). The format is as follows:



It should be noted that fault reports are only generated when the limits (as defined in the Outstation configuration data) are exceeded.

The **FLG** command is also available. This command displays a time-stamped log of Outstation faults and events.

The fault codes used with the **FLT** and **FLG** commands are given in the following table.

*= Code only used in the fault log (**FLG**), not the current fault list (**FLT**)

† = More detail on these codes is provided in the subsections after this table

Code	Description	<Additional Parameters> - Notes
ABF	Amber Ball lamp Fault	<phase> <no. of faults> - non UK
ABR*	Amber Ball lamp Replaced	<phase> <no. of faults> - non UK
BDC*	Bus config Data Change	<data group> - see section 13.11
BFC*	Bus DFM Fault Cleared	<beacon ID>
BUF	Bus DFM Fault	<beacon ID>
CCF	Compliance Fault	<plan no> <group no> <action no>
CCR*	Compliance Fault Reset	<plan no> <group no> <action no>
CDC*	141 Controller Data Change	
CDI	CLF Data Invalid	
CFL†	Green Conflict	<greens on>
CFS	Car Park Comms Fault	
CFC	Car Park Comms Fault Clear	
CID†	Controller Ignoring Demand	<phase>
CLF*	CLF Download Activated	
COD	COD Override	
COR*	COD Override Reset	
CPS*	Car Park State	<car park state>
CSD*	Invalid Status Download	
DBF†	Dim Bright Fail	<dim status>
DBT*	Dial Back Test	
DLD*	Config data Downloaded	
DWN*	Invalid Download	<error code> <function id> <data id>
EDI†	Equipment Data Invalid	- configuration data sumcheck fail
EDS*	Invalid Equipment Data C/S	
ERR*	Soft Error	
ERT*	Error Rate Too high	
ESA†	External Signal Active	<signal no.>
ESI†*	External Signal Inactive	<signal no.>
FFC†*	Ferranti Fault Cleared	<Ferranti log no.>
FFL†	Ferranti Fault Log entry	<Ferranti log no.>
FLC*	Flow Logging Complete	
FOV*	Fault log Overflow	
FSC	Firmware switch completed	
FSR	Firmware switch requested	
FTR*	Fault log Timer Reset	
FWD	Firmware downloaded	

*= Code only used in the fault log (**FLG**), not the current fault list (**FLT**)
† = More detail on these codes is provided in the subsections after this table

Code	Description	<Additional Parameters> - Notes
GAF	Green Arrow lamp Fault	<phase> <no. of faults>
GAR*	Green Arrow lamp Replaced	<phase> <no. of faults>
GCF	GPRS Comms Fault	
GCC	GPRS Comms Fault Clear	
GFC†*	GEC 3000 Fault Cleared	<GEC 3000 log no.>
GFL†	GEC 3000 Fault Log entry	<GEC 3000 log no.>
GGF	G1G2 Active	
GGR*	G1G2 Inactive	
GPR*	Clear GPS Fault	
GPS	GPS Fault	<GPS fault>
GP0*	Detector Counts, Group 0	
GP1*	Detector Counts, Group 1	
GRF	Graphos Fault Log entry	<location> <fault no.> <additional data>
HSI*	Handset plugged In	
HSO*	Handset Out	
INI*	Outstation RAM Initialised	
IOA*	IO line Override Active	
IPO	Instation Plan Override	<plan no>
IPR*	Instation Plan Override Reset	<plan no>
LAD*	Local Auto-Dial	
LAM	Long Alt. Max	<alt max no.> <stage>
LAR	Long All Red	
LEX	Long Extension	<stage>
LFL	Lamps Flashing	- input signal from controller
LIS	Long Inter-Stage	from <stage> to <stage>
LME*	Lamp Monitor data Error	
LMR*	Lamp Monitor Reset	
LMX	Long Max	<stage>
LNF*	Lamps Not Flashing	- input signal from controller
LOF	Lamps Off	
LON*	Lamps On	
LPC	Vehicle Classifier Loop Pair Fault Reset	<upstream input> <downstream input>
LPF	Vehicle Classifier Loop Pair Fault	<upstream input> <downstream input>
MCF†*	Controller Mode Change From	<mode no.>
MCH†	Controller Mode Change to	<mode no.>
MEN	MOVA Enabled (see MOF)	

*= Code only used in the fault log (**FLG**), not the current fault list (**FLT**)

† = More detail on these codes is provided in the subsections after this table

Code	Description	<Additional Parameters> - Notes
MFC*	Microsense Fault Cleared	<Microsense mnemonic>
MFL	Microsense Fault Log entry	<Microsense mnemonic>
MOF	MOVA Disabled (‘MOVA Off’)	- see section 9.6.10 on page 161
MPH	MOVA Phone Home flag set	- see section 9.7.3 on page 165
MSF	MOVA Serial link Failed	- see section 9.6.4 on page 153
MSG*	Invalid Message	<error code>
MSR	MOVA Serial link Restored	- see section 9.6.4 on page 153
NPR	No Port Response	- from 141 controller handset port
OEA*	OMCU Event Active	<event number>
OEI	OMCU Event Inactive	<event number>
OLC*	Occupancy Logging Complete	
OOV*	bus Operations log Overflow	
PCF	PAKNET Comms Failure	
PCR	PAKNET Comms Failure reset	
PFC*	Plessey/Siemens Fault Cleared	<Siemens log no.>
PFF	Pelican Flash Fail	<phase>
PFL	Plessey/Siemens Fault Log entry	<Siemens log no.>
PLF	Pedestrian Lamp Fault	<phase> <colour> <no. of faults>
PLR*	Pedestrian Lamp Replaced	<phase> <colour> <no. of faults>
PON*	Power On	
PWF*	Power Fail	
RAD	Radio clock fault	<radio clock error type>
RCC*	Radio Clock fault Cleared	<radio clock error type>
RNR	Reply Not Recognised	- from 141 controller handset port
RSF	Reg. Sign lamp Fault	<sign ID> <no. of faults>
RSR*	Reg. Sign lamp Replaced	<sign ID> <no. of faults>
SEM	Short Extension/Max	<stage>
SEQ†	Stage Sequence error	from <stage> to <stage>
SHI	Short Intergreen	from <phase> to <phase>
SHM	Short Min	<stage>
SOA	Switch Override Active	<switovrd number>
SOI*	Switch Override Inactive	<switovrd number>
SOF	Site Power Fail	- see section 13.6.13 on page 236
SON	Site Power Fail Clearance	- see section 13.6.13 on page 236
SSF	Switched Sign bulb Fault	<sign ID> <no. of faults>
SSR*	Switched Sign bulb Replaced	<sign ID> <no. of faults>

*= Code only used in the fault log (**FLG**), not the current fault list (**FLT**)
† = More detail on these codes is provided in the subsections after this table

Code	**Description**	**<Additional Parameters> - Notes**
STK†	Controller Stuck	
SWF	Switched sign tube Fail	<sign ID> <no. of faults>
SWR*	Switched sign tube Replaced	<sign ID> <no. of faults>
TFC†*	Peek PTC1 Fault Cleared	Free text fault description
TFL†	Peek PTC1 Fault Log entry	Free text fault description
VAC	Vehicle Classifier Vehicle Absence Fault Reset	<input no>
VAF†	Vehicle Absence Fail (DFM)	<input no>
VCA	Vehicle Classifier Vehicle Absence Fault	<input no>
VCF	Vehicle Classifier Confirm Fault	<output action>
VCL*	Vehicle Classifier Licence Fault	
VCP	Vehicle Classifier Vehicle Presence Fault	<input no>
VCR	Vehicle Classifier Confirm Fault Reset	<output action>
VLF	Vehicle Lamp Fault	<phase> <colour> <no. of faults>
VLR*	Vehicle Lamp Replaced	<phase> <colour> <no. of faults>
VPC	Vehicle Classifier Vehicle Presence Fault Reset	<input no>
VPF†	Vehicle Presence Fail (DFM)	<input no>
VMC*†	Variable Message Sign Fault Cleared	See details in section 13.6.17
VMS*†	Variable Message Sign Fault Set	See details in section 13.6.17
WDG*	Watchdog timeout	
WLF	Wait Lamp Fault	<phase> <no. of faults>
WLR*	Wait Lamp Replaced	<phase> <no. of faults>
XFC*	GEC CX Fault Cleared	<GEC CX log no.>
XFL	GEC CX Fault Log entry	<GEC CX log no.>
YPR*	Port Response returned	

<phase> : Letter A to P, identifying the controller phase, as configured for this OMCU

<stage> : A number 0 to 15, identifying the controller stage, as configured for this OMCU

<no. of faults> : The number of uncleared lamp faults recorded on this sensor

<beacon ID> : The configured beacon/reader identity number

<alt max no.> : The controller alternative max. green set number (1 to 3)

<sign ID> : The sign identity number as configured in the OMCU lamp monitoring data

<GEC CX log no.> : Controller fault log number, refer to CX controller handbook

<Siemens log no.> : Controller fault log number, refer to T200/T400/ST800/700 controller handbook

<Microsense mnemonic> : three-character fault mnemonic as read from the Microsense controller fault log

<radio clock error type> : 0 = No logic level signal detected from the radio clock on the configured Outstation input
1 = Radio clock is indicating reception quality is poor
2 = Noise/corruption detected on the logic level signal from the radio clock
See also RCS on page 251.

<plan no> : A number 0 to 15, identifying the plan number

<group no> : A number 0 to 31, identifying the group number within a plan

<action no> : A number 0 to 31, identifying the action numberwithin a group

<car park state> : 00 = Car Park Empty
01 = Car Park Almost Full
02 = Car Park Full

<error code> : Different error codes are used with different fault codes.

Valid with MSG :

00 = Invalid message type/ sub-type

0B = Invalid fault reset class

0D = Invalid data in counting message

0F = Invalid timestamp in ops log

Valid with DWN :

03 = Invalid function identity for equip data download

04 = Invalid data identity for equip data download

05 = Invalid data length for equip data download

Valid with CSD :

07 = Invalid function data identity for current status table download

09 = Invalid data index for current status table download

<function id> : A number identifying the function id of the invalid field

<data id> : A number identifying the data id of the invalid field

<GPS fault> : 8 bit value identifying detected GPS faults as follows:

Bit 0 = No data received from GPS receiver

Bit 1 = Corrupt data from GPS receiver –bad checksum.

Bit 2 = Unused.

Bit 3 = No valid satellite transmission

Other bits are unused and set to 0.

<event number> : A number 0 to 15, identifying the event number

<switovrd number> : A number 0 to 15, identifying the switch override number

13.6.3 Green Conflict Fault Data (FLT CFL)

When the OMCU detects a green/green conflict the following fault data will be presented:

FORMAT: **`FLT:!CLF wxyz`**

Where 'wxyz' are four HEX characters representing the conflict condition. A '1' in the bit position representing the phases that were at GREEN when the conflict condition was detected, for example:

```
FLT:!CLF 143A
```

The above example indicates that phases B, D, E, F, K and M were all at GREEN when the conflict occurred:

```
    HEX:   1     4     3     A
 Binary:  0001  0100  0011  1010
 PHASES:  PONM  LKJI  HGFE  DCBA
```

13.6.4 Ignoring Demands Fault (FLT CID)

If the controller is ignoring any detector or push-button demands then the following fault data will be presented:

FORMAT: **`FLT:!CID <phase>`**

Where <phase> is a letter (A to P) representing the controller phase that is not being serviced.

13.6.5 Dim/Bright Fault (FLT DBF)

If the controller fails to change from DIM to BRIGHT (or vice-versa) at least once in 24 hours then the following fault data will be presented:

FORMAT: **`FLT:!DBF n`**

Where 'n' is a number representing the current state:

0 - currently DIM
1 - currently BRIGHT
2 - state undefined
3 - processing to determine state not yet started

13.6.6 Equipment Data Invalid Fault (FLT EDI)

If the sumcheck on the Outstation configuration data fails during ‘download’ or during periodic background check, then the following fault will be presented:

FORMAT: **`FLT:!EDI`**

13.6.7 External Signal Active / Inactive Fault (FLT ESA / ESI)

If the OMCU has been configured to raise a fault report when an External signal becomes active (e.g. door switch) then the following fault data will be presented:

FORMAT: **`FLT:!ESA n`**

If the external signal returns inactive, then the following fault data will be presented:

FORMAT: **`FLT:!ESI n`**

Where ‘n’ is a number (0 to 7) representing the External Signal identity as defined on the configuration form.

NOTE: External Signal 0 is normally used to monitor the state of the controller mains supply.

13.6.8 Ferranti TSC Fault Data (FLT FFL)

If the OMCU has detected a fault entry in the Ferranti controller’s own fault log then the following fault data will be presented:

FORMAT: **`FLT:!FFL n`**

Where ‘n’ is a number representing the fault log report number:

NUMBER	FAULT DATA
0	Fault received but not recognised
1	Unexpected Red Lamp On *2
2	Unexpected Amber Lamp On *2
3	Unexpected Green Lamp On
4	Conflict *2
5	Test Conflict
6	Test No-Conflict
7	Test Non-Equivalence
8	Non-Equivalence
9	Conflict Monitor Status Error
10	Safety Red Lamp Fail *2
11	Pedestrian Red Lamp Fail *2
12	Red Lamp Fail *2
13	Amber Lamp Fail *2
14	Green Lamp Fail *2
15	Permanent Detect
16	Permanent No-Detect

17	Detector Flow Error
18	System Stopped *1
19	Power Fail *1 *2
20	MIS Failure *2
21	Checksum Failure *2
22	Safety 2 Red Lamps Out *3
23	Safety Red Lamp Out *3
24	Red Lamp Out *3
25	Amber Lamp Out *3
26	Green Lamp Out *3
27	Wait Lamp Out *3
28	Red Excess Current *3
29	Amber Excess Current *3
30	Green Excess Current *3
31	Wait Excess Current *3
32	Green No Output Voltage *3
33	Checksum Failure *3

*1 These faults are not reported by the OMCU since they do not appear in the uncleared fault list produced by the RFL command.
*2 Mk I controllers only.
*3 Mk II controllers only.

13.6.9 GEC 3000 Fault Data (FLT GFL)

If the OMCU has detected a fault entry in the GEC 3000 controller's own fault log then the following fault data will be presented:

FORMAT: **FLT:!GFL n**

Where 'n' is a number representing the fault log report number:

NUMBER	FAULT DATA
0	(unused).
1	General fault header
2	Green conflict detected by software.
3	" " " " "
4	(unused).
5	(unused).
6	Current detector fault status
7	" " " "
8	" " " "
9	" " " "
10	(unused).
11	(unused).
12	(unused).
13	(unused).
14	(unused).
15	Accepted detector fault status
16	" " " "

17	“ “ “ “
18	“ “ “ “
19	(unused).
20	(unused).
21	(unused).
22	(unused).
23	(unused).
24	Phase non-correspondence
25	“ “ “
26	(unused).
27	(unused).
28	Hardware & firmware conflict pattern check
29	“ “ “ “ “ “
30	(unused).
31	(unused).
32	EPROM or RAM sumcheck error.
33	Time Error (32mS).
34	J Address error.
35	“ “ “
36	“ “ “

13.6.10 GPS Fault (FLT GPS)

The OMU continually monitors the data stream from the GPS receiver (if configured). When a fault is detected, the following information will be presented.

FORMAT: **`FLT:GPS nnnnnnnn`**
or
`FLT:!GPS nnnnnnnn`

The urgency indication is determined by the configured routing item.

Nnnnnnnn represents the fault data as follows:
Bit 0 = no data received from GPS receiver (previous 3 seconds)
Bit 1 = Corrupt data from GPS receiver – bad checksum
Bit 2 = Unused (set to 0)
Bit 3 = No valid satellite transmission
Bits 4 to 7 = Unused (set to 0)

13.6.11 Mode Change Fault (FLT MCH)

If the OMCU has detected a change in controller operating mode the following fault data will be presented:

FORMAT: **`FLT:!MCH ‘n’`**

Where ‘n’ represents the mode the controller moved to i.e.:

0 - Fixed Time
1 - Manual
2 - Vehicle Actuated

3 - Cableless Link
4 - Bus priority
5 - Emergency Vehicle
6 - Hurry Call No.1
7 - Hurry Call No.2
8 - UTC (or MOVA)
9 - Part-time
10 - Start-up

NB: The same mode numbers are used in the MDE handset command

13.6.12 Stage Sequence Fault (FLT SEQ)

If the OMCU has detected a non-permitted stage to stage movement the following fault data will be presented:

FORMAT: **`FLT:!SEQ ff tt`**

Where ‘ff’ and ‘tt’ are the FROM and TO phase pattern numbers as defined in the OMCU’s configuration data.

13.6.13 Site Power Fail/Clearance (FLT SOF/SON)

If the OMCU reports the following criteria…

- OMU Power Failed – OMCU has lost mains power **AND**
- 141 Port Not Responding – Communications to the controller fail **AND**
- Lamps Off – Controllers signals are inactive for 3 seconds or longer

…the following Site Power Fail fault data will be presented:

FORMAT: **`FLT:!SOF`**

If the Outstation reports the following criteria…

- OMU Power Restored – OMU has regained mains power **OR**
- 141 Port Responding – Communications to the controller established **OR**
- Lamps On – Controllers signals are active for 3 seconds or longer

…the following Site Power Fail Clearance data will be presented:

FORMAT: **`FLT:!SON`**

The Site Power Fail fault and clearance will be reported with the same priority as configured for the OMU Power Failure report, i.e. “Urgent” or “Non-Urgent”.

13.6.14 Controller Stuck Fault (FLT STK)

If, during Fixed Time or CLF operation, the OMCU detects that the controller is not changing stage for more than the configured period, the following fault data will be presented:

FORMAT: **`FLT:!STK`**

13.6.15 Vehicle Absence Failure (FLT VAF)

The OMCU continually monitors detector inputs and if it senses that a particular input has not changed to the active condition for the configured time the following data will be presented:

FORMAT: **`FLT:!VAF n`**

'n' represents the number of the input that has failed in the range 0 to 63. See section 5.6.3, which starts on page 91, for locations of the Outstation inputs on the I/O Boards fitted. To determine the controller connections refer to the Outstation configuration data sheet for the particular I/O board.

13.6.16 Vehicle Presence Failure (FLT VPF)

The OMCU continually monitors detector inputs and if it senses that a particular input has not changed to the in-active condition for the configured time the following data will be presented:

FORMAT: **`FLT:!VPF n`**

See FLT VAF above for further details on the input number 'n'.

13.6.17 Variable Message Sign Faults (FLG VMC, VMS)

The UTMC VMS fault log display shows more information than the normal FLG commands:

FORMAT: **`dd-MMM-yy hh:mm:ss !VMX Y ZZZ`**

Where:

X	Fault Status: **S**=Fault Set, **C**= Fault Cleared
Y	VMS Sign Number (**0** to **7**)
ZZZ	VMS Fault Code (see below)

VMS Fault Code Descriptions:

VMS Fault Code	Fault Name	Description
MSG	VMS Message Set Failed	Cannot set the message on the sign, the message is not formatted correctly.
LDF	VMS LED Fault	Faulty Character board detected.
LNF	VMS Lantern Fault	Faulty Lantern detected.
VPF	VMS Sign Processor Fault	A FATAL fault has been logged.
PWF	VMS Sign Power Failed	VMS Sign has detected a power fail.
CLF	VMS Communications Link Fault	VMS Sign Cannot Communicate with character boards.
ERR	VMS Emergency	
LSF	VMS Light Sensor Fault	Light sensor has not seen a change in light level for 12 Hours.
WDG	VMS Sign Watchdog Reset Fault	VMS Sign has detected a watchdog reset.
NSR	VMS No Sign Response Fault	Cannot communicate to VMS sign, Sign not responding.
DIS	VMS Not Enabled	Licence code invalid or wrong operation mode.

13.6.18 Peek PTC1 Fault Data (FLT TFL)

Fault reporting from the Peek PTC1 controller works slightly differently from the other controllers that the OMCU monitors in that there is no attempt made to encode the fault report received from the controller fault log. Instead the raw message received from the PTC1 is logged and reported in full.

If the OMCU has detected a fault entry in the Peek PTC1 controller's own fault log then the following fault data will be presented:

FORMAT: **`FLT:!TFL <text>`**

Where <text> is a text string describing the fault as received from the PTC1 fault log.

13.7 PSTN COMMAND TABLE

Code	Major Index	Minor Index	Data Range	Description	Access Level
CCA	-	0 – 1	-	**Show Actual Call Count** Minor index: 0 – Actual Call Count Out (today). ❶ 1 – Actual Call Count In (today). ❶	RO
CCM	-	0 – 1	0 - 255	**Set Maximum Call Count** Minor index: 0 – Maximum Call Count Out (per day). ❷ 1 – Maximum Call Count In (per day). ❷ Range (0 = no limit).	Maint
CDA	-	0 – 3	-	**Show Actual Call Duration** Minor index: 0 – Current Single Call Duration Out. 1 – Current Single Call Duration In. 2 – Actual Total Call Duration Out (today). ❶ 3 – Actual Total Call Duration In (today). ❶ Units in minutes.	RO
CDC	0 – 1	0 – 9	-	**Call Disconnect Cause statistics log** (see section 13.7.1 for details)	Maint
CDM	-	0 – 3	Single Call 0-255 Total Calls 0 - 1500	**Set Maximum Call Duration** Minor index: 0 – Maximum Single Call Duration Out. ❷ 1 – Maximum Single Call Duration In. ❷ 2 – Maximum Total Call Duration Out (per day). ❷ 3 – Maximum Total Call Duration In (per day). ❷ Units in minutes (0 = no limit).	Maint
CTR	0 - 1	0 - 2	-	**Call Termination Record** (see section 13.7.2 for details)	Maint
CRQ	-	0	-	**Display CALL REQUEST flag** Data: 0 = No call request active 1 = call request active	RO

Code	Major Index	Minor Index	Data Range	Description	Access Level
CTN	0 - 2	0 - 11	HEX	**Configured Telephone Numbers** Major Index: Telephone number pointer. Minor Index: Digits 0 - 1 : Length of telephone number 2 - 11: Telephone Digits (Displayed in pairs). Data : HEX	RO
FTR	-	0 - 3	-	**Display PSTN FAULT TIMERS** Minor index : 0= Message Timer (0 - 30 minutes) 1=Identity Timeout Timer (0 - 40s) 2=Carrier Detect Timer (0 - 15s) 3=Override Timer (0 - 30s). Data: Time (in seconds or minutes)	RO
MCI	-	0 - 1	-	**Display MODEM CONTROL INDICATORS** (see section 13.7.3 for details)	RO
MDC	0 - 12	0 - 1	-	**Display MESSAGE HANDLER DIAGNOSTIC data.** (see section 13.7.4 for details)	Maint
MOS	-	-	ASCII	User defined modem configuration string	Maint
MPC	-	-	0-1	**Modem Power Cycle**	Maint
RIF	-	-	-	**Display RETRY INHIBIT flag** Data: 0-Inactive (dialling allowed) FF-Active (dialling not Allowed)	RO
RSC	-	-	-	**Display RETRY STEP counter** Data: 0-255 (showing the dial attempt in the retry table)	RO
RTR	-	0 - 2		**Display RETRY TIMER** Minor Index: 0 - Hours 1 - Minutes 2 - Seconds Data: Time	RO

Code	Major Index	Minor Index	Data Range	Description	Access Level
TNP	-	-	-	**Display TELEPHONE NUMBER POINTER** Data: 0 - 2 (showing which telephone will be dialled next).	RO

❶ These parameters are reset at midnight or first time power up. (Active calls at midnight are not included in the new call count).
❷ These parameters are reset at first time power up.

13.7.1 Call Disconnect Cause Statistics Log (CDC)

Whenever the OMCU disconnects itself from the telephone line the reason for that disconnection is stored in a log. By viewing this information the engineer can determine such things as:

→ The number of calls;
→ The quality of the line;
→ Whether there has been any unauthorised access to the Outstation.

The log is arranged in two groups - one is the current log, the other is the historic log. The current log is copied to the historic log whenever any counter in the current log overflows.

FORMAT: **CDC** <**m**> <**n**>

Where <**m**> is the 'major index' and <**n**> is the 'minor index'.

The major index controls the log that is being viewed i.e.:

Major Index = 0 - Current Log
Major Index = 1 - Historic Log

The minor index controls the part of the log is being viewed i.e.:

Minor Index	Function
0	Manual clearance of MTF initiated call.
1	Good termination
2	Carrier failed
3	Not used.
4	Initiate/Dial timeout.
5	Not used.
6	Not used.
7	Message timeout (i.e. although carrier is present the Instation has not sent a message to the OMCU for at least 20 minutes).
8	Identity timeout (i.e. the OMCU has not received an identity request during the required period).
9	The OMCU detected a supply 'brown-out' and

terminated the call that was in progress at the time.

If the maintenance access code has been entered the log data can be reset by entering '=0'.

13.7.2 Call Termination Record (CTR)

This log provides the engineer with information relating to the success of fault record transfers to the Instation. Again as in the CDC command describes above the major index provides access to both the historic and current log.

FORMAT: **CTR** <**m**> <**n**>

The major index <**m**> controls which log is being viewed i.e.:
Major Index = 0 - Current Log.
Major Index = 1 - Historic Log

The minor index <**n**> controls the part of the log is being viewed i.e.:

Minor Index	Function
0	Improperly terminated call (no abandon call received from the Instation).
1	Successful (i.e. faults transferred to the Instation).
2	Unsuccessful (i.e. faults not transferred to the Instation).

If the maintenance access code has been entered the log data can be reset by entering '=0'.

13.7.3 Modem Control Indicators (MCI)

This command displays the state of the modem interface (some indications are for hardware functions, others will be software). The default display is binary with a "1" indicating the signal is active.

FORMAT: **MCI** <**n**>

where <**n**> is the 'minor index'.

First Byte (i.e. Minor index = 0):

BIT No.	SIGNAL NAME	STATE REPRESENTED
0	CLEAR TO SEND	Not used.
1	REQUEST TO SEND	Not used.
2	CARRIER DETECT	Instation carrier present.
3	DATA SET READY	Link established with the Instation modem
4	CALLING/ANSWERING	Call/answer sequence in progress (0 = calling & 1 = answering).
5	Not used	
6	CALL REQUEST	Auto-call by OMCU (not set if retry delay is preventing the OMCU from dialling out)

7	CALLING INDICATE	Answer to ringing tone required

Second Byte (i.e. Minor index = 1):

BIT No.	SIGNAL NAME	STATE REPRESENTED
0	CALL INTERRUPTED	Not used.
1	DATA LINE OCCUPIED	Call or answer in progress.
2	DATA TERMINAL READY	Ready to call or answer.
3 – 7	Unused.	

13.7.4 Message Diagnostic Data (MDC)

During any Instation - Outstation (OMCU) communication all characters and messages are checked for errors. This log stores these together with a total count of all good characters received.

Again as in previous logs two sets are stored one for current data (miner index = 0) and one for historic data (minor index = 1)

As each condition occurs the relevant count is incremented and when the number of characters received reaches its maximum value (FFFFH) then all counts are copied to the ‘historic log’ (minor index = 1) and then reset to zero. If any count reaches its maximum value whilst the character count is below its maximum limit then the value ‘locks’ at FFFFH.

Note: All count information is displayed in HEX.

FORMAT: **MDC** <**m**> <**n**>

where <**m**> is the ‘major index’ and <**n**> is the ‘minor index’.

MAJOR INDEX	COUNT TITLE
0	Good Characters received
1 }	Not used (characters which are received with
2 }	parity errors etc are substituted with ‘?’ and so
3 }	cause other error counts to be incremented.
4	Invalid character
5	Checksum error
6	Link message address error
7	Message type/sub-type unknown error
8	Repeat block requests
9	Message restart requests
10	Sequence errors
11	Transmit block-buffer usage
12	Error message buffer usage

If the maintenance access code has been entered the log data can be reset by entering ‘=0’.

13.7.5 Modem Power Cycle (MPC)

The MPC function will cause the power to the modem to be switched off and on again after approximatley 1 second at 3:50 am. To enable this funtion the handset command MPC=1 should be entered when in maintenance mode, MPC=0 disables it. The default condition is disabled.

There have been reports from the field of GSM modems losing connection to the GSM network and the only apparent way of regaining it is to power cycle the modem. This command automates this process alleviating the need for a site visit.

13.7.6 CSQ

Should the GSM modem lose registration with the GSM service provider the CSQ command will provide the signal strength and time at which the deregistration was logged.

13.8 MAINTENANCE COMMAND TABLE

Code	Major Index	Minor Index	Data Range	Description	Access Level
BAS	-	-	0 - 2	**Handset Display Base:** 0 = Binary, 1 = HEX, 2 = Decimal	open
CAL	-	-	0 - 1	**Call Instation:** Request local dial-back using configured telephone numbers. Write 1, Outstation responds with 0 when actioned	Maint
CBR	-	-	0, 101 - 105	**Controller Baud Rate:** Overrides configured setting when monitoring CX controller:- 0 = 1200 baud (default) 101 = 300 baud 102 = 1200 baud 103 = 2400 baud 104 = 4800 baud 105 = 9600 baud	Maint
EBR	-	-	0 - 31	**Engineering Base** segment for RAM display Segment = EBR value x 10000H	open
EEL	-	-	0 - 255	**Examine Enhanced 141 Link** to the ST800/700, values are:- 0 = Not configured 1 = Connecting 2 = Checking ST800/700 (1200 baud) 3 = Link active (19200 baud) 254 = Old ST800/700 firmware 255 = Controller not detected (link out/power off)	RO
ENR	0 -FFFF	-	ENG	**Engineering RAM** Display Starting segment defined by EBR command	RO

Code	Major Index	Minor Index	Data Range	Description	Access Level
ERR	-	-	0 - 100	**Enable Restart Reports:** 0=Disable, 1=Enable Values higher than 1 are used to log diagnostic data in the Operations Log as follows: 2=TCAM UTC control data and status flags. 4=UTC data on serial link to controller. 8=Upload/download data on serial link to controller. 16=Handset messages on serial link to controller. 32=Controller RTC check. Values may be combined to allow logging of more than one diagnostic.	Maint
FLG	-	-		**Fault Log:** Display time stamped fault log, one line at a time. Shows the date and time of the most recent (approx. 1000) faults and events. See section 13.6 for fault abbreviations. <space key> moves to end of log + key shows earlier entry - key shows later entry	RO
FRE	-	0 - 3	0 - 99	**Processor Free Time:** FRE 0 = current free time FRE 1 = average free time FRE 2 = lowest current free time (over the last two seconds) FRE 3 = for engineering use only (lowest average since reset)	RO
GRC	-	-	text	**Green Record Command:** Display the latest Green Record Logging command received from the RMS instation:- GRC:<start> <end> <cmd> See section 13.8.6 for details. Use OLG to display logged data – see 13.18.3 for OLG display format.	RO

Code	Major Index	Minor Index	Data Range	Description	Access Level
INI	-	-	0 – 3	**Initialise Outstation:** INI=0 restarts the software without initialising any RAM data. INI=1 clears all Outstation RAM, Fault Log, Operations Log and configuration data. On a combined OMCU and MOVA unit, INI=1 just initialises the OMCU. Use INI=2 to initialise MOVA alone and INI=3 to completely initialise the OMCU and MOVA, see section 9.6.2 on page 152. INI=10 is the same as INI=3 but also clears all files from the RAM based filesystem and resets the RTC to Jan 1st 2000 00:00:00. INI=20 clears all files from the RAM based filesystem, the software is not restarted. INI=21 resets the RTC to Jan 1st 2000 00:00:00, the software is not restarted.	Maint
IOP	-	0 - 7	-	**Internal I/O Ports:** (see Section 13.8.1 for details)	Maint
LTS	-	-	0-255	**Modem Loop Back Test:** `LTS=1`........TO START TEST `LTS:2`........TEST RUNNING `LTS:0`........Test passed `LTS:255`....Test failed	Maint
OPM	-	-	-	**Outstation Operating Mode:** (see Section 13.8.2 for details)	RO
PIC	-	-	-	**Firmware Identity Code:** Data: Outstation firmware Identity & Issue	RO
RIC	-	-	-	**Display version of Redboot**	RO
PUD	-	0 - 5	-	**Power Up Data:** (see Section 13.8.3 for details)	Maint
RAM	-	-	256 or 1024	**RAM Installed** Displayed the number of Kilobytes of RAM installed in the OMU.	RO
RCS	-	-	-	**Radio Clock Signal:** Displays message being received from the Radio Clock and Radio Clock error counts. See 13.8.5	RO

Code	Major Index	Minor Index	Data Range	Description	Access Level
SCT	-	-	0 - 7	**Set 0141 Controller Type** 1=T200/T400, 2=C3000, 3=TLC, 4=Through Port, 5=CX, 6=Microsense, 7=Peek PTC1 0=Command actioned. Only operates while the OMCU is unconfigured.	Maint
SEB	-	0 - 3	-	**Soft Error Buffer**. (see Section 13.8 for details)	RO
SEC	-	-	0 - 4	**Soft Error Count.** Displays the number of soft errors detected.	RO
SES	0 - 9	0 - 1	0 -FFFF	**Soft Error Status** - internal fault store for engineering diagnostics	RO
SOB	-	-	ENG	**Set output bits:** bits 0 to 2 are on LMU I/O board 0 bits 3 to 6 are on LMU I/O board 1 bit 7 is on LMU I/O board 2 When used with a Bus / MOVA I/O board as board 0, SOB sets the first 8 outputs on the board. Also see the SOP command that follows… NOTE: SOB always shows the state of the output ports, irrespective of any inversions configured using OPS.	Maint

SOP	0 - 2 board number	-	BINARY	**Set output ports** - sets/displays the state of the 16 outputs on Bus / MOVA I/O board ‘n’ (0-2), e.g.
				`SOP n:0000000000000000`
				But, if board ‘n’ is not a Bus / MOVA I/O board, display will show:
				`SOP n:----------------`
				If the first board is an LMU I/O board, then SOP 0 can be used to read and set the outputs on that and any subsequent LMU I/O boards just like SOB:
				`SOP 0:--------00000000`
				NOTE: SOP always shows the state of the output ports, irrespective of any inversions configured using OPS.
					Maint

Code	Major Index	Minor Index	Data Range	Description	Access Level
STP	-	-	0 - 63	**Set Through Port Configuration** STP=0 sets 300 baud, 7 data bits, 1 stop, no parity. Other options are selected:- 1200 baud - add 16 2400 baud - add 32 9600 baud - add 48 odd parity - add 4 even parity - add 8 2 stop bits - add 2 8 data bits - add 1 e.g. STP=24 sets 1200 baud, 7 data bits, even parity **Use with SCT=4 to operate.** NOTE: On Issue 13 or later, when a GPS receiver is configured on the 141 port, the baud rate is overridden to 4800.	Maint
TMP	1 - 64 flag no.	-	0 - 1	**'Temp' Flags** used by OMCU conditioning. Flags can be changed to control conditioning operations (where configured on the OMCU).	Maint
TOD	-	-	time format	**TOD** displays day, date and time. e.g. TOD: Thu 25-JUN-98 15:53:46 TOD=THU sets the day TOD=25JUN98 sets the date TOD=15:55:00 sets the time	Maint
XXC	-	-	-	**Switch HANDSET to 0141** Controller Note: Not usable via Remote Handset	open
XXM or MOVA	-	-	-	**Switch HANDSET to MOVA** Note: Not usable via Remote Handset or while connected to the controller (use XXO first)	open
XXO	-	-	-	**Switch HANDSET to Outstation** Note: Not usable via Remote Handset. Use 'FI' from the MOVA menu after XXM, not XXO.	open

13.8.1 Outstation I/O Port State (IOP)

The state of the Outstation's input/output ports may be displayed by the use of this command.

Also see DIP for digital inputs, MSI for mains' state inputs and SOP for digital outputs.

FORMAT: **IOP** <**n**>

Where <n> is the minor index (0 - 7) and results in the following:

Note: The display base binary

`IOP 0`	COMMS CHIP PORT
`IOP 1`	PPC 8255 PORT 2
`IOP 2`	BOARD 0 MAINS I/Ps
`IOP 3`	BOARD 0 RELAY O/Ps (bits 0 - 3) and MAINS I/Ps (bits 6 & 7)
`IOP 4`	BOARD 1 MAINS I/PS
`IOP 5`	BOARD 1 RELAY O/Ps (BITS 0 - 3) and Mains I/Ps (bits 6 & 7)
`IOP 6`	BOARD 2 MAINS I/PS
`IOP 7`	BOARD 2 RELAY O/Ps (bits 0 - 3) and MAINS I/Ps (bits 6 & 7)

13.8.2 Outstation Operating Mode (OPM)

This command displays the current OMCU mode. Values are:

DATA	FUNCTION
0	Monitoring On
1	Monitoring Off
2	Configuration Data being downloaded
3	Configuration Download Fail
4	Configuration Checksum Failure
5	OMCU Unconfigured.

13.8.3 Outstation Power-Up Data (PUD)

This command displays the Outstation power-up diagnostic data:

MINOR INDEX	DATA	DESCRIPTION
PUD 0:	0 - 3	Last start-up type: 0 = Normal power-up 1 = Watch-dog fail and restart 2 = First time power-up 3 = Soft error and restart
PUD 1:	0 - 255	Normal power-up cumulative count
PUD 2:	0 - 255	Watch-dog timeout restart cumulative count
PUD 3:	0 - 255	First time power-up cumulative count
PUD 4:	0 - 255	Soft error power-up cumulative count
PUD 5:	0 - 255	New firmware power-up cummulative count

NOTE : PUD 5 is available on units which support the firmware download facility.

13.8.4 Soft Error Buffer (SEB)

If the Outstation operating system detects a 'soft error' this buffer will store relevant data on the error type. Any entries in this array should be conveyed to Traffic Engineering (Siemens Poole) for detailed analysis.

FORMAT: **SEB** <**n**>

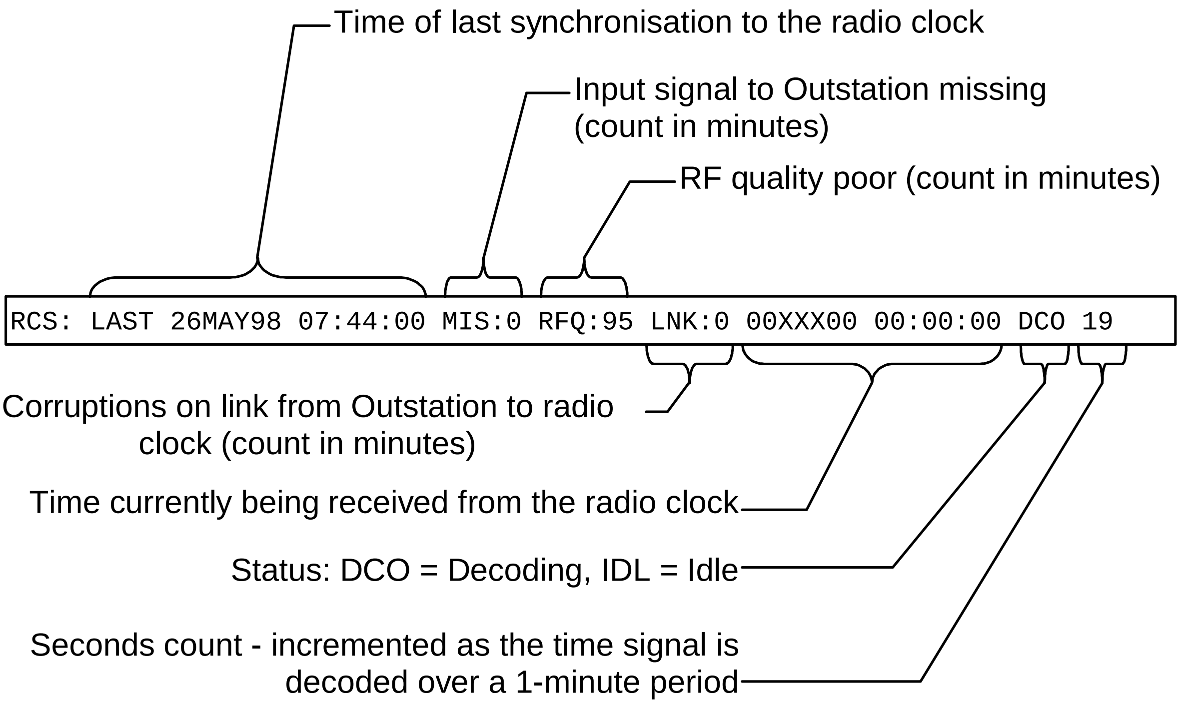
where <n> is the minor index (0 - 3) and enables access to the last four soft errors (0 is the most recent). The data is presented in HEX

The codes that most likely to be encountered are:

`ERROR=0001`	RAM read/write test fail
`ERROR=0403`	PROM checksum fail
`ERROR=120?`	Processor errors (bus errors, illegal instructions, unknown interrupts etc)
`ERROR=138?`	Bus / MOVA I/O Board UART errors (RS485 communications chip operation fault)
`ERROR=161?`	MOVA REQUESTED REBOOT – SEE MOVA ERROR LOG FOR REASON.

13.8.5 Radio Clock Signal (RCS)

RCS example display format:



With a correctly operating radio clock, the time of last synchronisation will be within one or two minutes of the current time, and the MIS, RFQ and LNK error counts will be zero.

The Outstation internal clock is only synchronised to the radio clock time signal when the radio clock signal has been received correctly over two consecutive minutes and the RF quality indicated by the radio clock is good.

After power on, the radio clock takes 10 to 15 minutes to indicate good RF quality to the Outstation. During this period, the RFQ error count is incremented. The error counts are cleared when the Outstation synchronises to the radio clock signal.

In times of poor radio propagation it may not be possible for the clock unit to synchronise the Outstation. However good reception is only required for a few minutes each day to maintain the accuracy of the Outstation's real time clock.

As an additional installation aid a signal reception indicator is present in the Radio Clock unit. When the 'test switch' within the Radio Clock is pressed the Reception Indication LED will flash regularly for about 1 minute if good signal strength is present. If random flashes are displayed then the reception is poor and the clock unit may not be correctly orientated.

13.8.6 Green Record Command (GRC)

The GRC command displays the last Green Record Logging command (if any) received from the RMS instation. The display format is:-

GRC:<start> <end> <cmd>, where

<start> = start date + start time each day
<end> = end date + end time each day
<cmd> = indicates stage and/or phase logging command received.

GRC example display formats:

```
GRC:17-FEB-10 00:00:00 22-FEB-10 00:00:00 STG & PHS LOGGING
```

- Log stage and phase changes 24hrs per day from 17-FEB-10 to 22-FEB-10.

```
GRC:17-FEB-10 08:00:00 22-FEB-10 13:00:00 STAGE LOGGING
```

- Log stage changes from 8:00AM to 1:00PM each day from 17-FEB-10 to 22-FEB-10.

```
GRC:17-FEB-10 00:00:00 01-JAN-00 00:00:00 STAGE LOGGING
```

- Log stage changes continuously from 17-FEB-10 (no end date).

```
GRC:01-JAN-00 00:00:00 01-JAN-00 0:00:00 STOP LOGGING
```

- Stop any Green Record logging

13.8.7 Operations Log Displays for Green Record (OLG)

The OLG command displays the Green Records using the following formats:-

1. Green Record - Phase Start

18-FEB-10 12:01:52 635.8s phase B start, OFF time:51.0s	
"18-FEB-10 12:01:52"	Timestamp of the event
"635.8s"	Timestamp in seconds from startup
"phase B start"	This is the phase which has just started green
"OFF time:51.0s"	This is the preceeding red/amber/blackout period for the phase

2. Green Record - Phase Termination

18-FEB-10 12:02:02 645.8s phase B end, ON time:10.0s	
"18-FEB-10 12:02:02"	Timestamp of the event
"645.8s"	Timestamp in seconds from startup
"phase B end"	This is the phase which has just terminated green
"ON time:10.0s"	This is the preceeding green period for the phase

3. Green Record - Stage Change

19-FEB-10 13:25:29 4779.7s strm:3 mde:2 15.0s stg:12->255	
"19-FEB-10 13:25:29"	Timestamp of the event
"4779.7s"	Timestamp in seconds from startup
"strm:3"	Controller stream number, starting from 0.
"mde:2"	Controller mode (1=FT, 2=VA, 255=unknown, see 13.6.11 for other values)
"15.0s"	Stage duration in seconds (in this case the duration of stage 12 was 15 seconds)
"stg:12->255"	Stage change which has just occurred (in this case change from stage 12 to the interstage)

4. Green Record – Controller Lamps Off

19-FEB-10 13:25:29 4779.7s strm:0 mde:1 LAMPS OFF, 15.9s stg:0->255	
"19-FEB-10 13:25:29"	Timestamp of the event
"4779.7s"	Timestamp in seconds from startup
"strm:0"	Controller stream 0.
"mde:1 LAMPS OFF"	Controller mode (1=FT) and lamps on/off indication
"15.9s"	Stage duration in seconds (in this case the duration of stage 0 was 15.9 seconds)
"stg:0->255"	Stage change from stage 0 to unknown.

5. Green Record – Controller State Unknown (e.g. Link Fail)

19-FEB-10 13:25:29 4779.7s strm:0 mde:255 LAMPS UNDEF, 44.3s stg:1->255	
"19-FEB-10 13:25:29"	Timestamp of the event
"4779.7s"	Timestamp in seconds from startup
"strm:0"	Controller stream number, starting from 0.
"mde:255 LAMPS UNDEF"	Controller mode and lamp state unknown
"44.3s"	Stage duration in seconds (in this case the duration of stage 1 was 44.3 seconds)
"stg:1->255"	Stage change from stage 1 to unknown

13.8.8 RMS 8-Bit Comms

Code	Major Index	Minor Index	Data Range	Description	Access Level
BSZ	-	-	1-1024	**Block Size**: The maximum number of bytes which can be transferred in an 8-bit RMS message between the Outstation and RMS Instation in either direction.	Maint

13.9 BUS OPERATING COMMAND TABLE

Code	Major Index	Minor Index	Data Range	Description	Access Level
DBM	-	-	-	**Display Bus Messages**: Real time monitoring of bus/vehicle detection message reception on all RS485 channels.	RO
OLG	-	-	-	**Operations Log**: Display time stamped operations log, one line at a time. Shows the date and time of the most recent vehicle detections. See overleaf for description. <space key> moves to end of log + key shows earlier entry - key shows later entry	RO
BRX	-	-	-	**Bus Receive** message simulation: The character string entered is treated as if it had just been received on the RS485 serial channel identified by the BRP handset command. **Beacon Bus Detect** Character strings beginning '0' are assumed to be TfL Beacon Bus Detect messages and have the TfL 'framing' (STX, checksum and ETX) added automatically. For example : BRX=02A110000001100102 **RTIG Bus Detect** Character strings beginning 'RS' are assumed to be TfL RTIG Bus Detect messages and have the TfL 'framing' (STX, checksum and ETX) added automatically. For example : BRX=RS1212D62BB20000 **SIETAG Bus Detect** Character strings beginning '0' are assumed to be Bus Detect messages from SIETAG Readers V3.0 or earlier and have a CR appended.	Maint

Code	Major Index	Minor Index	Data Range	Description	Access Level
				For example : BRX=LS 0123456789ABCDEF **SIETAG Bus Detect** Character strings beginning ‘1L’ – ‘4L’ are assumed to be Bus Detect messages from SIETAG Readers V4.0 or later and have a CR appended. For example : BRX=1LWT 0123456789ABCDEF	
BRC	-	-	0 - 65535	**Bus Receive Count** Repeats the BRX command for the given count. Allows simulation of a large number of detect messages, for test.	Maint
BRP	-	-	0 - 11 (4 ports per board)	**Bus Receive Port** Identifies the RS485 serial channel on which the simulated Bus message is received.	Maint

TfL specific command:

Code	Major Index	Minor Index	Data Range	Description	Access Level
BMD	-	-	0 - 9	**Beacon Message Delay** This command sets / displays the minimum delay in 6.67ms units by which the RS485 responses to TfL beacons are delayed. 0 = 0ms minimum delay 1 = 6.67ms minimum delay 2 = 13.33ms minimum delay 3 = 20ms minimum delay (default) 4 = 26.67ms minimum delay 5 = 33.33ms minimum delay 6 = 40ms minimum delay 7 = 46.67ms minimum delay 8 = 53.33ms minimum delay 9 = 60ms minimum delay NOTE: In practise, the actual delay can be up to 6.67ms longer than the minimum due to processing times.	Maint
RMD	-	-	0 – 9	**RTIG Message Delay** This command sets / displays the	Maint

Code	Major Index	Minor Index	Data Range	Description	Access Level
				minimum delay in 6.67ms units by which the RS485 responses to RTIG messages are delayed. See BMD description above for values.	

13.9.1 Operations Log Display Formats (OLG)

The Operations Log holds approximately 10,000 vehicle detect or other messages.

1. SIETAG Vehicle Detection

25-APR-99 10:51:10 R:6 W S:F C:2 A:0 T:3 I:4 OP:12 R:1 V:2C3 O:255 M:12		
R	Loop ID / Reader ID	HEX, 1-3F The first character (if present) identifies the number of the loop (0-3) connected to a SIETAG reader on which the vehicle was detected. If not present the loop number is assumed to be 0.
W	Tag type / format	ASCII 'C' = contact monitor or conditioning input. When vehicle detection received from a V3.0 SIETAG reader: 'W' = read/write 'S' = Siemens encrypted 'M' = multi-page 'R' = read only When vehicle detection received from a V4.0 (or later) SIETAG reader: 'S' = Siemens encrypted 'O' = SIEMENS open 'T' = TIRIS Unknown
S	Supplier Code	HEX, 1 - FF
C	Customer Number	HEX, 1 - FFF
A	Area	HEX, 1 - F
T	Vehicle Type	HEX, 1 - F
I	Activation ID	HEX, 1 - F
OP	Operator	HEX, 1 - FF
R	Route Number	HEX, 1 – FFF
V	Vehicle Number	HEX, 1 - FFFFFF
O	Output Action	DECIMAL 0 = No output action defined 1 - 30 = Output Action List entry number 229 - 255 = Reason for rejection
M	Message Count	DECIMAL, 0 - 99

2. Beacon Bus Detection

`25-APR-99 10:41:10 BID:6 B:6734256 R:560 PI:2 PO:2 O:1 M:90`		
BID	Beacon ID	HEX, 1 - FF
B	Bus Radio ID	DECIMAL, 0 - 9999999
R	Bus Logical Route ID	DECIMAL, 0 - 999
PI	Priority Input Level	DECIMAL, 0 - 9
PO	Priority Output	DECIMAL, 0 - 7
O	Output Action	DECIMAL 0 = No output action defined 1 - 30 = Output Action List entry number 229 - 255 = Reason for rejection
M	Message Count	DECIMAL, 0 - 99

3. RTIG Bus Detection

`25-APR-99 11:01:10 TSN:6 MN:31 TP:1 PI:2 SD:0 LVCC:3 VN:123 PO:2 O:1`		
TSN	Traffic Signal Number	DECIMAL, 0 – 16383
MN	Movement Number	DECIMAL, 0 – 31
TP	Trigger Point	DECIMAL, 0 – 3
PI	Priority Input Level	DECIMAL, 1 – 3
SD	Schedule Deviation	DECIMAL, 0 – 15
LVCC	Local Vehicle Control Centre	DECIMAL, 0 – 15
VN	Vehicle Number	DECIMAL, 0 – 8191
PO	Priority Output	DECIMAL, 0 – 3
O	Output Action	DECIMAL 0 = No output action defined 1 - 30 = Output Action List entry number 224 - 255 = Reason for rejection

4. Corrupt Detection (also used for engineering log messages)

`25-APR-99 10:51:10 E:D4 M:.034578768.`		
E	Error Code	HEX D2 = Invalid LAN Address D4 = Invalid Message Type D6 = Invalid Checksum D8 = Bad Format Message
M	Message Data	Message characters as received on the serial port. Non-printing characters e.g. <STX> are displayed as a ‘.’

NOTE: A GAMBICA vehicle detection received from a SIETAG reader is recorded as an Invalid Message Type error (D4).

Operations Log Message Rejection Codes

Code	Description	RTIG	Beacon	SIETAG
224	Trigger Point not Found in Output Association List	✓		
225	Schedule Deviation not Found in RTIG Priority Map	✓		
226	Input Priority not Found in RTIG Priority Map	✓		
227	Movement Number not Found in Output Association List	✓		
228	LVCC not Found in Output Association List	✓		
229	Invalid Loop Number			✓
230	Invalid Message Count		✓	
231	Invalid Tag Mode in Configuration			✓
232	Invalid Area Mode in Configuration			✓
233	Vehicle Number not Found in Output Association List			✓
234	Invalid Area			✓
235	Tag Format not Found in Configuration			✓
236	Area not Found in Configuration			✓
237	Access Time not Found in Output Association List	✓	✓	✓
238	Operator Number not Found in Output Association List			✓
239	Customer Number not Found in Output Association List			✓
240	Invalid Tag Format			✓
241	Invalid Vehicle Type			✓
242	Invalid Vehicle Number			✓
243	Invalid Operator Number			✓
244	Invalid Activation ID			✓
245	Invalid Supplier Code			✓
246	Invalid Customer Number			✓
247	Beacon ID/Reader ID not Found in Configuration		✓	✓
248	Output Activation Request List Full	✓	✓	✓
249	Beacon ID/Reader ID not Found in Output Association List		✓	✓
250	Route Number not Found in Output Association List		✓	
251	Invalid Beacon ID		✓	✓
252	Invalid Radio ID		✓	
253	Invalid Route Number		✓	
254	Invalid Priority Level	✓	✓	
255	Blacklisted in Output Association List	✓	✓	✓

13.10 BUS CONFIGURATION COMMAND TABLE

13.10.1 Generic Commands

Code	Major Index	Minor Index	Data Range	Description	Access Level
BFT	-	0 - 15 as BID	0 - 255	**Bus DFM Fault Time** 1-255 = The beacon/reader/RTIG input is reported faulty if no priority vehicle is detected for this number of hours. Reported OK on the next detection. Covers both RS485 and contact type inputs. 0 = No fault monitoring	Maint
BFO	-	-	0 - 255	**Bus DFM Fault Output** 0 - 15 = Output on I/O board 0 16 - 31 = Output on I/O board 1 32 - 47 = Output on I/O board 2 255 = No DFM output configured	Maint
BFR	-	-	0 - 2	**Bus DFM Fault Reporting** 0 = No fault reporting 1 = Non-urgent (interrogation only) 2 = Urgent report (dial out)	Maint
JID	-	-	0 - 9 and <space>	**Junction ID:** The ID can only be set if the Outstation is unconfigured (forced by INI=1). 16 digits maximum, including <space> characters.	Maint
LDV	-	-	0 - 11	**Load Default Values** and enter normal operating mode. This command only operates if the Outstation is unconfigured (forced by INI=1) 0 = No defaults loaded 1 = Load TfL Bus Processor defaults 2 = Load SIEMENS Bus Processor defaults 3 = Load Car Park Processor defaults and enable car park counting. 4 = Load SIEMENS Bus Processor defaults + enable routing of SIETAG vehicle detections via 141 serial port 5 = Load UTMC OTU Outstation defaults. 2 x Control & 6 x Reply bytes.	Maint

Code	Major Index	Minor Index	Data Range	Description	Access Level
				6 = Load UTMC VMS Outstation defaults. 12 x Characters ; 2 x Rows 7 = Enable MOVA facility. 8 = Load UTMC OTU Outstation defaults for Enhanced Serial Link with 2 x Control & 6 x Reply bytes. 9 = Enable TCAM facility. 10 = Enable GRAPHOS facility. 11 = Load TfL Bus Processor defaults for RTIG operation. NOTE: When LDV = 3 is entered the Outstation automatically performs a software restart.	
POC	0 - 11 (4 ports per board)	0	0 - 6	**RS485 Port Configurations (use POS to implement)** Baud rate: 0=300, 1=1200, 2=2400, 3=4800, 4=9600, 5=14400 and 6=19200	Maint
		1	0 - 3	**Parity setting:** 0=space, 1=odd, 2=even, 3=mark	
		2	0 - 1	**Parity enable:** 0=disable, 1=enable	
		3	1 - 2	**Stop bits:** 1 or 2	
		4	7 - 8	**Data bits:** 7 or 8	
POS	-	-	0 - 1	**Port Set** 1 = Set RS485 ports to the configured settings	Maint
RCD	-	-	0 - 255	**Radio Clock fault Delay** 1 - 255 = Fault delay in hours. 0 = No delay (any fault is reported)	Maint
RCI	-	-	0 - 255	**Radio Clock Input** 0 - 47 = Input on I/O board 0 48 - 95 = Input on I/O board 1 96 - 143 = Input on I/O board 2 200 = GPS on RS485 serial port 0 201 = GPS on RS485 serial port 1 : 211 = GPS on RS485 serial port 11 220 = GPS on 141 serial port 255 = Radio clock not used / no GPS receiver	Maint
RCR	-	-	0 - 2	**Radio Clock fault Reporting** 0 = No fault reporting 1 = Non-urgent (interrogation only) 2 = Urgent report (dial out)	Maint

Code	Major Index	Minor Index	Data Range	Description	Access Level
RET	-	-	0 - 300	**Re-activation Time** 0-300 = If a vehicle is re-detected within this time (in seconds), then the second detection is ignored. This is only applied to the 16 most recent vehicles detected at the site.	Maint
RTO	-	-	0 - 255	**Real Time Clock Output** Pulsed at 05:00 AM each day. 0 - 15 = Output on I/O board 0 16 - 31 = Output on I/O board 1 32 - 47 = Output on I/O board 2 255 = No output configured	Maint
SRC	-	0 - 15 as BID	0 - 255	**Message Source** 99 = Any RS485 serial channel. 100 = Conditioning input bit 101 = Single RS485 detection per bus, within given re-activation time (See RET command) 0-95 = Contact monitored input line number 255 = Not used	Maint

13.10.2 TfL Beacon Commands

Code	Major Index	Minor Index	Data Range	Description	Access Level
ACT	1 – 30 list entry number	0	0 - 1000	**Output Period** 0-1000 = Time for which the Detect Outputs are activated, in 0.1 sec units (100 secs max)	Maint
		1	0 – 20	**Start Delay** 0-20 = Time delay before activating the Detect Output, in 0.1 sec units (2 secs max)	
		2	0 – 20	**Stop Delay** 0-20 = Time delay after activating the Detect Output in 0.1 sec units. (2 secs max)	
		3	0 – 255	**Output Code** 0-11 = Demand Output to be activated on I/O output board 0 255 = No output	
ASS	0 - 255 list entry number	0	0 - FF	**Beacon ID** 1-FF = Accepted ID 0 = List entry not used	Maint
		1	0 - 255	**Output Action** 1-30 = Activate this Output Action List entry number if the other conditions match 0 = No output action (other entries in List still processed) 255 = Blacklist i.e. any vehicle detection matching this route etc is prevented from activating an output, irrespective of other Output Association List entries.	
		2	0 - 998	**Lowest accepted Route Number**	
		3	0 - 998	**Highest accepted Route Number**	
		4	-	Unused	
		5	-	Unused	
		6	-	Unused	
		7	-	Unused	
		8	0 - 10	**Day of Week** 1 = Mon, 2 = Tue, 3 = Wed, 4 = Thur, 5 = Fri, 6 = Sat, 7 = Sun 8 = Every day except Sunday 9 = Mon to Fri, 10 = Sat and Sun	

Code	Major Index	Minor Index	Data Range	Description	Access Level
				0 = Every day (default)	
		9	hh:mm	**Start Time** hh = hours, 0-24 mm = min, 0-59	
		10	hh:mm	**Finish Time** hh = hours, 0-24 mm = min, 0-59 If finish < start then the finish time is for the following day (i.e. spans midnight)	
		11	-	Unused	
		12	-	Unused	
		13	-	Unused	
		14	0 - 1	**System Flags** 0 = TfL beacon entry	
BID	-	0 - 15 beacon list entry number	0 - FE	**Beacon ID** 1-F = RS485 Beacon ID number. 10-FE = Beacon ID number used for contact or conditioning input. 0 = Not configured.	Maint
LAN	-	-	0 - FFF	**LAN Address** 1-FFF = Only action detection messages with this LAN address - other values cause an error entry to be made in the operations log, along with the raw data. 0 = No LAN address filtering	Maint
MAP	-	0 - 9 input priority	0 - 7	**Priority Map** 0-7 = Priority Level to be output to the controller/OTU, binary coded onto three output lines, while the TfL Output Action is being performed. Input priority 9 is used for contact monitoring.	Maint

13.10.3 SIETAG Commands

Code	Major Index	Minor Index	Data Range	Description	Access Level
ACT	1 - 30 list entry number	0	0 - 1000	**Output Period** 0-1000 = Time for which the Detect Outputs are activated, in 0.1 sec units (100 sec max)	Maint
		1	0 - 1000	**Start Delay** 0-1000 = Time delay before activating the Detect Output, in 0.1 sec units (100 sec max)	
		2	-	Unused	
		3	0 - 255	**Output Code** 0-47 = Demand output to be activated where the outputs are: 0-15 on I/O board 0 16-31 on I/O board 1 32-47 on I/O board 2 (TfL style activation) 200 = The outputs to be activated are defined by the channel number and the 4 bits of the Activation ID. The Activation ID is mapped onto 4 outputs as follows : Channel 0 → outputs 0 to 3 Channel 1 → outputs 4 to 7 : Channel 11 → outputs 44 to 47 201 = The 'bus' output is activated for the channel number (the Activation ID is ignored) The 'bus' output is activated as follows : Channel 0 → output 1 Channel 1 → output 5 : Channel 11 → output 45 255 = No output	
ARM	-	-	0 - 2	**Area Mode** 0 = no area filtering applied 1 = Zone mode: discard vehicle message if area field is not equal to Area Value 2 = Priority mode: discard vehicle message if area field is less than	Maint

Code	Major Index	Minor Index	Data Range	Description	Access Level
				Area Value	
ARV	-	-	0 - F	**Area Value** 0-F = Sets either the zone or priority level for vehicle message filtering, depending on Area Mode.	Maint
ASS	0 - 255 list entry number	0	0 - FF	**Reader ID** 1-FF = Accepted ID 0 = List entry not used	Maint
		1	0 - 255	**Output Action** 1-30 = Activate this Output Action List entry number if the other conditions match 0 = No output action (other entries in List still processed) 255 = Blacklist i.e. any vehicle detection matching this route etc is prevented from activating an output, irrespective of other Output Association List entries.	
		2	-	Unused	
		3	-	Unused	
		4	0 - FFFFFF	**Lowest accepted Vehicle ID**	
		5	0 - FFFFFF	**Highest accepted Vehicle ID**	
		6	0 - FFF	**Accepted Customer** 1-FFF = Customer number 0 = Any customer number accepted	
		7	0 - FF	**Accepted Operator** 1-FF = Operator number 0 = Any operator number accepted	
		8	0 - 10	**Day of Week** 1 = Mon, 2 = Tue, 3 = Wed, 4 = Thur, 5 = Fri, 6 = Sat, 7 = Sun 8 = Every day except Sunday 9 = Mon to Fri, 10 = Sat and Sun 0 = Every day (default)	
		9	hh:mm	**Start Time** hh = hours, 0-24 mm = min, 0-59	
		10	hh:mm	**Finish Time** hh = hours, 0-24 mm = min, 0-59 If finish < start then the finish time is for the following day (i.e. spans midnight)	

Code	Major Index	Minor Index	Data Range	Description	Access Level
		11	-	Unused	
		12	-	Unused	
		13	-	Unused	
		14	-	Unused	
BID	-	0 – 11 serial port number 12 - 15 not used	0 - FF	**SIETAG Reader ID** 1-F = Assign this Reader ID to the RS485 serial port (index). There are 4 serial ports for each I/O board address. 10-FE = Reserved for indicating loop no. on multiplexed SIETAG reader. 0 = Not configured.	Maint
CUS	-	0 - 15	0 - FFF	**Customer ID** 1-FFF = Customer ID recognised by the Bus Processor. 0 = list entry not used	Maint
DFA	-	0 – 15 as BID	0 - 30	**Default Action** 1-30 = Output action to be taken when the customer number is not recognised 0 = no output action	Maint
TAF	-	-	1 - 3	**Tag Format** 1 = Only Siemens encrypted tags are accepted - others are filtered out, but still logged. 2 = Only unencrypted tags are accepted 3 = Both encrypted and unencrypted tags are accepted (default).	Maint
TAI	-	-	0 - 255	**Tag Interval** 0 - 255 = The time in seconds between the end of one vehicle detection and the start of the next vehicle detection transmitted on the 141 serial port	Maint

13.10.4 RTIG Commands

Code	Major Index	Minor Index	Data Range	Description	Access Level
ACT	1 - 30 list entry number	0	0 – 1000	**Output Period** 0-20 = Time for which the Detect Outputs are activated, in 0.1 sec units (2 sec max)	Maint
		1	0 – 20	**Start Delay** 0-20 = Time delay before activating the Detect Output, in 0.1 sec units (2 sec max)	
		2	0 – 20	**Stop Delay** 0-20 = Time delay after activating the Detect Output in 0.1 sec units. (2 sec max)	
		3	0 - 255	**Output Code** 0-11 = Demand Output to be activated on i/o output board 0 255 = No output	
ASS	0 - 255 list entry number	0	0 - FF	**RTIG Link ID** FF = RTIG link 0 = List entry not used	Maint
		1	0 - 255	**Output Action** 1-30 = Activate this Output Action List entry number if the other conditions match 0 = No output action (other entries in List still processed) 255 = Blacklist i.e. any vehicle detection matching this route etc is prevented from activating an output, irrespective of other Output Association List entries.	
		2	0 - 998	**Lowest accepted Route No.**	
		3	0 - 998	**Highest accepted Route No.**	
		4	-	Unused	
		5	-	Unused	
		6	-	Unused	
		7	-	Unused	
		8	0 - 10	**Day of Week** 1 = Mon, 2 = Tue, 3 = Wed, 4 = Thur, 5 = Fri, 6 = Sat, 7 = Sun 8 = Every day except Sunday 9 = Mon to Fri, 10 = Sat and Sun	

Code	Major Index	Minor Index	Data Range	Description	Access Level
				0 = Every day (default)	
		9	hh:mm	**Start Time** hh = hours, 0-24 mm = min, 0-59	
		10	hh:mm	**Finish Time** hh = hours, 0-24 mm = min, 0-59 If finish < start then the finish time is for the following day (i.e. spans midnight)	
		11	0 - 255	**Movement Number** 0-31 = Movement number 100 = List entry not configured 255 = Any movement number	
		12	0 - 255	**Trigger Point** 0 = Registration 1 = Request 2 = Clear 3 = Other Application 255 = Any trigger point	
		13	0 - 255	**LVCC** 0-15 = LVCC number 255 = Any LVCC number	
		14	0 - 1	**System Flags** 1 = RTIG entry	
BID	-	0 – 15 serial port numbe r	FF	**RTIG Link ID** Serial port is dedicated as an RTIG input.	
PRI	-	0 - 1	0 - 255	**Priority Output Allocation** 0-47 = Demand output to be activated where the outputs are : 0-15 on I/O board 0 16-31 on I/O board 1 32-47 on I/O board 2 255 = no output configured	Maint
RCM	-	-	0 - 255	**RTIG Communications Monitor** Count of the number of Link Test messages received. This value wraps to 0 when 255 is reached. This command is used by Field Service engineers to check the basic functionality of the RTIG radio link.	RO
RPM	0 - 31	0	0 - 255	**Schedule Deviation** 0 = Schedule deviation not supplied	Maint

Code	Major Index	Minor Index	Data Range	Description	Access Level
				1 = Late by more than 15 minutes 2 = Late by more than 10 minutes 3 = Late by more than 7 minutes 4 = Late by more than 5 minutes 5 = Late by more than 3 minutes 6 = Late by more than 2 minutes 7 = Late by more than 1 minute 8 = Within 1 minute of ETA 9 = Early by more than 1 minute 10 = Early by more than 2 minutes 11 = Early by more than 3 minutes 12 = Early by more than 5 minutes 13 = Early by more than 7 minutes 14 = Early by more than 10 minutes 15 = Early by more than 15 minutes 100 = Any 255 = Not configured	
		1	1 – 100	**Input Priority** 1-3 = Priority read from the RTIG Bus Detection. 100 = Any	
		2	0 – 3	**Priority Output Value** 0-3 = Value written to the RTIG Priority output lines.	
TSN	-	-	0 - 16383	**Traffic Signal Number** 0-16383 = Uniquely identifies a Bus Processor in an RTIG network.	Maint

13.11 Bus Configuration Notes

All configuration commands take effect as soon as they are entered, except for POC. The POC command changes the RAM data, but the hardware serial ports are not re-configured until the POS command is used or the Outstation is powered off then on.

When the handset connection is terminated, System Log entry(s) are created indicating the changed area(s), with change codes allocated to each handset command used, as follows:

0 = BID, SRC, ASS

1 = MAP, ACT, RPM, PRI

2 = POC, POS

3 = BFT, BFO, BFR

4 = LAN, TSN

5 = LDV

6 = RCI, RCR, RCD, RTO

7 = RET

8 = CUS, ARM, ARV, TAF, DFA

Thus a change to one or more data items in the Output Association List will only result in a single log entry.

13.12 CAR PARK COUNT COMMAND TABLE

Code	Major Index	Minor Index	Data Range	Description	Access Level
ACC	-	1 - 23	0 - 1	**APT Counting category** Counts on an APT Skidata systems are divided into categories to cover, for example, contract parking, public parking, people who have used credit cards etc. 0 - Do not include count category 1 - Include count category All categories selected as included will be added together to produce the final count. The default APT count categories are : 1 - Short term parker 2 - Contract parker 3 - Total 4 - 24 - user defined	Maint
ACN	-	-	0 - 254	**APT Car Park Number** Specified by APT Skidata	Maint
ACV	-	-	0 - 1	**APT Skidata Host Comms version** 0 - Version 1 1 - Version 2	Maint
ADN	-	-	10 ASCII digits	**APT Device Number e.g. 1** Specified by APT Skidata (Usually 1)	Maint
ADS	-	-	0 - 1	**Enable interface with APT Skidata equipment** 0 - Count from loops 1 - Count from APT Skidata	Maint
AFN	-	-	10 ASCII digits	**APT Skidata Facility Number** e.g. 550012 Specified by APT Skidata	Maint
AFR	-	-	0 - 1	**Enable / Disable reporting of loss of comms with APT Skidata equipment to Siespace**. NOTE : IF SIESPACE IS AT VERSION 7.4 OR LOWER THEN TURN FAULT REPORTING OFF. 0 - fault reporting off 1 - fault reporting on	Maint

Code	Major Index	Minor Index	Data Range	Description	Access Level
AFT	-	0	0 - 16383	**Car park almost full increasing threshold** This value indicates the car par occupancy level when the car park state changes from **Spaces** to **Almost Full**.	Maint
		1	0 - 255	**Car park almost full decreasing threshold offset** This value is subtracted from the almost full increasing threshold and the result indicates the car park occupancy level when, the car park state changes from **Almost Full** to **Spaces**.	
AIP	-	-	15 ASCII	**IP Address of APT Skidata** equipment e.g. 169.254.253.1	Maint
APN	-	-	32 bit no.	**APT Port Number** (Default for APT Skidata equipment is 10200)	Maint
CCL	-	0 - 9	0 - 255	**Current Car Park Loop Counts** Indicates the number of vehicles counted by each entry or exit loop since the last status message was transmitted to the Instation.	RO
COS	-	-	0 - 3	**Car Park Occupancy Status** 0 = Normal 1 = Underflow 2 = Overflow 3 = Overflow and Underflow	RO
CPC	-	-	0 - 16383	**Car Park Capacity**	Maint
CPL	0 - 9	0	0 - 1	**Car Park Loop Type** 0 = Entry loop 1 = Exit loop 2 = Bi-directional loop For dual loop sensors see **U loop input** and **bidirectional logical channel** setup below. Only dual loop sensors can be set to bi-directional. In this mode the direction of vehicles passing across the loop pair will incement or decrement the occupancy accordingly. Bi-directional loops should be installed so that vehicles entering the car park increment the occupancy.	Maint
		1	0 - 255	**A Loop Input** 0 - 47 = Input on 1st I/O board 48 - 95 = Input on 2nd I/O board 96 - 143 = Input on 3rd I/O board 255 = Loop not used	

Code	Major Index	Minor Index	Data Range	Description	Access Level
		2	0 - 255	**No Detect Period** 1 - 255 = The car park loop is reported faulty if no vehicle is detected for this number of hours. 0 = Not monitored	
		3	0 - 255	**Permanent Detect Period** 1 - 255 = The car park loop is reported faulty if a permanent detection is present for this number of minutes. 0 = Not monitored	
		4	0 - 255	**U Loop Input** 0 - 47 = Input on 1st I/O board 48 - 95 = Input on 2nd I/O board 96 - 143 = Input on 3rd I/O board 255 = Loop not used The U loop is only applicable to dual loop detectors and is used to assign the second or U loop of the pair. For single loop detectors set to 255.	
		5	0 to 9 or 255	**Bidirectional logical channel** Sets a 'logical' ID for the exit channel in a bidirectional configuration (cars exiting will increment the loop count on this channel). For unidirectional configurations set this to 255.	
CPO	-	-	0-65535	**Current Car Park Occupancy**	Maint
CPS	-	-	Binary	**Car park State** Bit 0 = spaces Bit 1 = Almost full Bit 2 = Full Bit 3 = Closed	RO
CPT	0 - 9	0	0 - 23	**Timetable hours**	RO
		1	0 - 59	**Timetable Minutes**	
		2	0 - 59	**Report Interval in minutes**	

Code	Major Index	Minor Index	Data Range	Description	Access Level

DBG	-	0	0 to 4	**Enable / Disable debug**
				Minor index is the code module from which debug output will be enabled (with the exception of index = 1, see below), data is the level of output. Specifically
				
				`Index  Mode`
				`0      ENABLEALL,`
				`1      OUTPUTMODE,`
				
				`       Module`
				`2      APTSKIDATA,`
				`3      CORESYSTEM,`
				`4      CONFIGSTORE,`
				`5      MISCIP,`
				`6      ETHIP,`
				`7      PPPIP,`
				`8      IP,`
				`9      MANPORT,`
				`10     SER2IP,`
				`11     CFGDAT,`
				`12     SYSCTL,`
				`13     REMOTEUPG,`
				`14     TCAM,`
				`15     SERSWH,`
				`16     REDBOOTUPG,`
				`17     UTMCVMS,`
				`18     DDNS,`
				`19     IMU141,`
				`20     RMSCOMMS,`
				`21     MOVA_S0,`
				`22     MOVA_S1,`
				`23     GPRS`
				`24     MODDEM`
				`25     MON_141`
				`26     RMSIP`
				
				`Data   Dedug Level`
				`0      DISABLED`
				`1      ERROR`
				`2      WARNING`
				`3      NOTICE`
				`4      INFO`
				
				`Eg. DBG 0=1 enables output from all modules at error level. DBG 2=2 enables debug output from the APTSKIDATA module at warning level.`
				Index 1 defines the output mode, this can be either 0 to direct output to the handset port, 1 to direct it to the system.log file or 2 to direct it to the operations log (see OLG command).
					Maint

DOR	-	-	0 - 255	**Door Input** 0 - 47 = Input on 1st I/O board 48 - 95 = Input on 2nd I/O board 96 - 143 = Input on 3rd I/O board 255 = Door switch not used	Maint

Code	Major Index	Minor Index	Data Range	Description	Access Level
FCP	-	-	1 - 63	**Fill Rate Calculation Period** The number of minutes of historical count data that the fill rate is computed over.	Maint
FUT	-	0	0 - 16383	**Car park full increasing threshold** This value indicates the car par occupancy level when the car park state changes from **Almost Full** to **Full**.	Maint
		1	0 - 255	**Car park full decreasing threshold offset** This value is subtracted from the full increasing threshold and the result indicates the car park occupancy level when, the car park state changes from **Full** to **Almost Full**.	
RMP	-	0	0 - 63	**Ramp Up Time Threshold** The number of minutes before the FULL state is reached at which ramp up mode is entered	Maint
		1	0 - 15	**Ramp Up Period** The interval in minutes between status reports to the Central Office whilst in ramp up mode	
		2	0 - 63	**Ramp Down Time Threshold** The number of minutes before the ALMOST FULL state is reached (from the FULL state) at which ramp down mode is entered	
		3	0 - 15	**Ramp Down Period** The interval in minutes between status reports to the Central Office whilst in ramp down mode	

13.13 PAKNET/GPRS COMMAND TABLE

Code	Major Index	Minor Index	Data Range	Description	Access Level
ADR	-	-	0 - 254	**Address of the OMCU** This is used to check the message received from the Instation is for this OMCU.	Maint
GUP	-	-	-	**GPRS User logon:password** e.g. GUP=web:web	Maint
IPI	-	0	-	**Set IP address and port number of Instation PC** e.g. IPI 0=192.168.100.1:2084	Maint
KEY	-	-	16 ASCII digits	**GPRS Encryption key**	Maint
PPD	-	-	-	**GPRS debug** on=1, off=0	Maint
PTO	-	-	-	**PPP Link Timeout** in seconds	Maint
RCA	-	-	14 ASCII digits 0 - 9	**Remote Comms user address** (NUA) of the form : 2353ABCDEFGHIJ 2353 is the Data Network Identification Code allocated to the Vodafone Data Network by OFTEL. ABCD identifies the base station channel with which the Radio-PAD is communicating. EFGHIJ is the unique address of a port on the Radio-PAD. For example : The NUA of ports 100122 and 100123 on a Radio-PAD tuned to a base station channel with identification 1990 would be 23531990100122 and 23531990100123.	Maint
RCB	-	-	0 - 4	**Remote Comms Baud Rate** where 0 = 300, 1 =1200, 2 = 2400, 3 = 4800, 4 = 9600	Maint

Code	Major Index	Minor Index	Data Range	Description	Access Level
RCT			0 - 6	**Remote Comms Type** *0 = PSTN 1 = PAKNET 2 = GPRS with iConnector 3 = GPRS with direct connection to MC35 Terminal 4 = Null modem PPP 5 = Leased line PPP 6 = Direct manual access to modem * Option 0 is the default and also covers GSM modem links. Note for this option to work ensure IP addressing (IPM) has not been set	Maint
RCU	-	-	0 - 1	**Remote Comms Update** This command requests the OMCU to dial the Instation and transmit the status message.	Maint
RDF	-	-	0 -1	**Reset Detector Fault** When a detector fault on the car park loops has been reported this command will clear the fault for any loops that have changed state since the failure was detected.	Maint

13.14 DUSC COMMAND TABLE

13.14.1 CLF Operating Commands

Code	Major Index	Minor Index	Data Range	Description And Remarks	Access Level
APL	-	-	CLF plan 0 - 15 or Isolate 255	**Active CLF Plan** is displayed. Use RPL to request a different plan or Isolate. NOTE: When CLF is isolated due to fault this command still indicates the requested plan, even though it's not running CLF.	RO
CCP	-	-	1	**Call Current Plan** **i**.e. when CCP=1 is entered, the OMCU rescans the timetable and re-establishes the current plan (if any) and timeswitch events (if any). Used to restore the OMCU back to normal operation after an RPL has been used.	Maint
CCT	-	-	0 – 255 secs	**Current Cycle Time** Shows the incrementing cycle time for the CLF plan which is currently running.	RO
CGR	-	Stream 0 - 31	CLF group 0 - 31	**Current CLF Group** Displayed for the specified stream.	RO
CGT	-	Stream 0 - 31	0 – 255 secs	**Current CLF Group Time** remaining counting down to the end of the current group i.e. how long before the next group is due to start.	RO
CID	-	-	<text>	**CLF Data Set Identity** This identity number/text is used to check which CLF data set is currently loaded into the OMCU working store.	RO

Code	Major Index	Minor Index	Data Range	Description And Remarks	Access Level
COD	-	BUS/ MOVA I/O board No (0 – 2)	0 - 2	**Copy Detectors** Copy to Outputs on this board: 0 = Allow normal control of outputs (e.g. by CLF facility). 1 = Copy the state of the first 16 detector inputs over to the 16 outputs on this BUS/MOVA I/O board 2 = Copy the inverted state of the first 16 detector inputs over to the 16 outputs on this BUS/MOVA I/O board	Maint
CYC	-	CLF plan 0 - 15	0 – 255 secs	**Cycle Time** For the specified CLF plan. 0 to 254 = cycle time 255 = plan is disabled	RO
MTS	-	0 – 31 Stream No	-	**Monitor CLF Status** For a Stream. See section 13.14.1.1 for more details.	RO
OPS	0 – 2 board number	-	BINARY	**Output Sense** This command sets / displays the state of the inversion sense bit for each of the 16 outputs on BUS/MOVA IO board N where N=0, 1 or 2. Outputs 0 - 15 are on board 0, 16 - 31 are on board 1 etc. 0 = do not invert 1 = invert OPS 0: controls the inverting of 8 outputs spread across a maximum of 3 LMU IO boards. If the second or third board is an LMU IO board the display will show: OPS N:---------------- If board N is being used by the MOVA application: OPS N:-(MOVA OUTPUTS)-	Maint
RPL	-	-	CLF plan 0 – 15 or Isolate 255	**Requested CLF Plan** Displays the plan requested by the timetable / user defined conditioning and can be used by the operator to request a different plan until the next timetable event (or CCP is used).	Maint

Code	Major Index	Minor Index	Data Range	Description And Remarks	Access Level
SWS	-	Event 0 - 31	0 - 1	**Timeswitch Settings** Displays the state of each timeswitch event, either active or inactive. 0 = inactive 1 = active	RO

13.14.1.1 Monitor CLF Status (MTS)

1) When a CLF plan is running

MTS n:<Time> <Source> **Plan** <Plan Number>:<Cycle Timer>,**Group** <Group Number>:<Group Timer>, **Action** <Action Number>,<Off Control Reason>

See table below for explanation of information types.

Information	Explanation
<Time>	System time in hh-mm-ss format
<Source>	Identifies the source of the current CLF plan or isolate TTB = timetable RPL = RPL handset command OVR = Instation plan override CND = conditioning input
<Plan Number>	The CLF plan number 0 to 15
<Cycle Timer>	The CLF plan cycle timer counting up to the configured plan cycle time whereupon it reverts to 0 and the count restarts
<Group Number>	The currently running group 0 to 31
<Group Timer>	The active group timer counting downwards from the configured group time to 0 whereupon it reverts to the next configured group time and the count restarts
<Action Number>	is the active action 0 to 31, corresponding to the active group
<Off Control Reason>	The reason why the plan is not actively controlling the CLF outputs. If this field is blank, CLF is running the indicated plan. - COMP = Compliance fault - G1G2 = G1G2 fault - TTB = Timetable isolate - COND = User defined condition active, e.g. manual switch off - CFG = No CLF configuration or CLF configuration corrupt - ENT = Plan entry time active or no CLF plan - CYCL = Plan cycle time is 0 or 255 seconds. - LSUP = No lamp supply.

2) No CLF plan is running i.e. isolate

MTS n:<Time> <Source> **Isolate**

See Table above for explanation of information types.

3) No configuration present or configuration is invalid

MTS n: No Configuration Present

13.14.2 Accessing CLF Configuration Data Commands

Code	Major Index	Minor Index	Data Range	Description And Remarks	Access Level
ACF	-	-	0 - 1	**CLF Action on Compliance Fail** This is the action that is performed when the OMCU detects a compliance failure. 0 = isolate mode 1 = continue normal CLF output control	RO
CAO	Action number 0 - 31	0 - 3	0 - 255	**CLF Action Outputs** Displays a pair of port numbers and masks identifying the output ports and the CLF outputs on a BUS MOVA IO board driven by the specified action. Minor index=0–port A (0-3) Minor index=1–port A mask(0-FF) Minor index=2–port B (0-3) Minor index=3–port B mask(0-FF) NB: Ports 0 and 1 are on the first board; ports 2 and 3 are on the second board.	RO
CCC	-	-	0 – 255 secs	**CLF Compliance Fail Clearance Time** This is the time that a confirm input condition must be present (may be across instances of the same group action) before a compliance fault clearance is raised.	RO
CCF	-	-	0 – 255 secs	**CLF Compliance Fail Time** This is the time that a confirm input condition must be absent (within the context of a single group action) before a compliance fault is raised.	RO
CEC	-	Action number 0 - 31	0 - 1	**CLF Enable Compliance** This displays an indication of whether compliance checking is enabled for a group action. 0 = disabled 1 = enabled	RO
IFA	Influence set 0 – 15	CLF group 0 - 31	Action number 0 - 31	**Influence Action Number** i.e. which action (and thus which stream) does this group introduce in the specified influence set.	RO

Code	Major Index	Minor Index	Data Range	Description And Remarks	Access Level
IFN	Influe set 0 – 15	CLF group 0 - 31	Influe Type 0 - 3	**Influence Function** i.e. which function does this group perform in the specified influence set.	RO
OFF	CLF plan 0 - 15	Time part 0 - 1	0 – 59 secs / mins	**CLF Offset** From the configured base time (e.g. 2am) for the specified CLF plan. OFF <Plan> 0 : <0 to 59 seconds> OFF <Plan> 1 : <0 to 59 minutes>	RO
PIA	-	-	0 - 2	**Plans Isolate Action** i.e. what action is taken with the CLF outputs when the isolate state is entered. 0 = all outputs deactivated 1 = all output activated 2 = copy detector input states	RO
PLE	-	CLF plan 0 - 15	0 – 255 secs	**Plan Entry Time** For the specified CLF plan i.e. the normal point in the cycle where the plan is required to start. 255 = plan can start at any point in the cycle.	RO
PLI	-	CLF plan 0 - 15	Influe set 0 - 15	**Plan Influence Set** Used by the specified CLF plan.	RO
PLT	CLF plan 0 - 15	CLF group 0 - 31	0 – 255 secs	**Plan Time** For the specified CLF plan and group i.e. the time within the cycle that this group comes into effect, where any value larger than the cycle time disables the group for that plan. These times are specified as an offset from the start of the plan cycle. A group is associated with a unique action number, which in turn is associated with a unique stream. Two groups that affect the same stream should not be given the same group time as only one will be run i.e. ensure that each group runs for at least 1 second before the next group is introduced.	RO

Code	Major Index	Minor Index	Data Range	Description And Remarks	Access Level
PLX	-	CLF plan 0 - 15	0 – 255 secs	**Plan Exit Time** For the specified CLF plan i.e. the normal point in the cycle where the plan is required to finish. 255 = plan can exit at any point in the cycle.	RO
RSA	-	Action number 0 - 31	Stream 0 - 31	**Related Stream for Action** Displays the stream associated with the specified group action.	RO
TDY	-	Day Code 0 - 15	Text	**Timetable Day Codes** Displays the configured day codes where: 'Sun', 'Mon'… are displayed if the day code just selects a single day. 'Xsu', 'Xmo'… are displayed if the day code selects all but one particular day, e.g. 'everyday except Sunday' or 'everyday except Monday'. 'WEK', 'WKD' or 'WND' if everyday (all week), every weekday or just the weekends (Saturday and Sunday) are selected, respectively. If the days selected by the day code do not match those above, then 'MTWTFSS' is displayed with a '-' for each day not selected, e.g. 'M-W-F–' is displayed if only Monday, Wednesday and Friday are selected.	RO
TSD	-	Entry 0 - 63	Date DDMMMYY and Day Code 0 - 99	**Timetable Special Days** Table defines up to 64 various dates when the normal timetable events should not be run, e.g. public holidays. On the specified date, the specified day code replaces the normal day code for that day.	RO

Code	Major Index	Minor Index	Data Range	Description And Remarks	Access Level

TSH	Entry
	0 - 31
		Second Index
		0 – 1
		0 = start
		1 = end
			Date
			DDMMMYY
				Timetable Special Holiday
				Table defines up to 32 periods between the specified start and end dates (inclusive) where different timeswitch events are executed, e.g. during school holidays.
				For example:
				`TSH 0 0:29-MAR-03`
				and
				`TSH 0 1:09-APR-03`
				These define a period from March 29th 2003 until April 9th 2003 inclusive where different timeswitch events run.
					RO

TSW	Entry 0 - 63	Second Index 0 - 5	Value 0 - 215	**TimeSwitch Settings** Contain 64 ‘timetable’ entries numbered 0 to 63, identified by an ‘N’ in the following descriptions. Each entry consists of 6 items that are described in section 13.14.2.2. If any of the items are out of range, then the OMCU ignores the whole timetable entry. Note: If no timeswitch events are specified for the current day, then the last event on the previous day will continue to run. For example, the OMCU will still be running plan 1 today if plan 1 was the last plan called for yesterday and there are no timeswitch events specified for today. The OMCU will not revert to ‘isolated’ unless a specific timeswitch entry to ‘isolate’ the OMCU is specified for today.	RO

13.14.2.1 Influence Function (IFN)

Each influence function is described below:

Type	Explanation
0	**Deactivate -** Deactivate all outputs associated with this output action stream
1	**Activate -** Deactivate any existing outputs for the stream and activate the specified output action. NB: Any conditional activations (influence type 2) for the stream are discarded.
2	**Conditional -** If the condition specified for the output action is true or becomes true, then de-activate any existing outputs for the stream and activate the specified output action. These outputs remain active even if the condition is removed. NB: Any conditional activations (influence type 2) for the stream are discarded.
3	**Freeze -** The currently active output action on the stream is held. Only applicable following influence type 2.

13.14.2.2 Timeswitch settings (TSW)

TSW N 0 : <Day Code> (<Abbreviation>)

This first item specifies on which day or days the timetable event applies.
Day Codes 0 to 15 specify a normal day or normal days of the week,

> e.g. '`TSW N 0:3 (TUE)`' since code 3 is usually configured to mean just on Tuesdays, see **TDY**.

Day Codes 16 to 99 are 'Special Days' see **TSD**.
If 'Special Holiday Periods' are configured using **TSH** then:

> Day Codes 0 to 15 only run outside these holiday periods.
> Day Codes 100 to 115 only run within these holiday periods.
> Day Codes 200 to 215 run regardless of holiday periods.

TSW N 1 : <0 to 23 hours>
TSW N 2 : <0 to 59 minutes>
TSW N 3 : <0 to 59 seconds>
The above items specify at which time the timetable event applies.

TSW N 4 : <Operation Code 0 to 4>
TSW N 5 : <Additional Operation Code Parameter>
These last two items specify the operation that should be carried out. The valid Operation Codes are described as follows:

> **TSW N 4 : 0**
> **TSW N 5 :** <**Don't Care**>
> The operation code '0' tells the OMCU to isolate, i.e. drop out of CLF (Cableless link facility) mode, returning to VA mode for example.
>
> **TSW N 4 : 1**
> **TSW N 5 :** <**CLF Plan Number 0 to 15**>
> The operation code '1' tells the OMCU to start the CLF plan specified by 'TSW N 5'.

TSW N 4 : 3
TSW N 5 : <TimeSwitch Event Number 0 to 31>
The operation code ‘3’ tells the OMCU to introduce the timeswitch event specified by ‘TSW N 5’, without affecting any other timeswitches.

TSW N 4 : 4
TSW N 5 : <TimeSwitch Event Number 0 to 31>
The operation code ‘4’ tells the OMCU to cancel the timeswitch event specified by ‘TSW N 5’, without affecting any other timeswitches.

13.14.3 CLF Time Commands

Code	Major Index	Minor Index	Data Range	Description And Remarks	Access Level
CDI	-	-	0 - 255	**Clock Drift from Instation** Time displays the number of seconds by which the OMCU clock has drifted from the Instation at the last time synchronisation message. If the OMCU is deemed to be fast or slow or matches the Instation time then the output will denote this as follows CDI:Fast Ns CDI:Slow Ns Where N is the number of seconds of drift. CDI:On time CDI:No I/S Sync	RO
CKA	-	-	<Date 0 to 31> <Month JAN to DEC> <Year 00 to 99>	**Clock to Advance** Clock to advance by one hour at 2am on this date for daylight saving. Once actioned, the date is automatically adjusted to find the same day in the following year. Enter ‘CKA=0’ to cancel the date.	Maint

Code	Major Index	Minor Index	Data Range	Description And Remarks	Access Level
CKM	-	-	text	**GPS Clock monitor** This command is used to display the last message from the GPS receiver. This will indicate if the Outstation is getting valid GPS clock synchronisation times. The format of the display will be as follows:- CKM:$GPRMC,hhmmss,status Where : Hhmmss = time of day Status = A or V, A=available, V=not available.	RO
CKR	-	-	<Date 0 to 31> <Month JAN to DEC> <Year 00 to 99>	**Clock to Retard** Clock to be put back by one hour at 2am on this date for daylight saving. Once actioned, the date is automatically adjusted to find the same day in the following year. Enter ‘CKR=0’ to cancel.	Maint
CKS	-	-	text or = 0	**Clock Synchronisation time** Displays the last GPS Clock Synchronisation time used to synchronise the Outstation. e.g. CKS: <CR> TUE3MAR99 11:57:33 Entering CKS=0<CR> will cause the GPS time displayed to be reset to 1st Jan 90 and the Outstation will resynchronise as soon as possible.	Maint
CSI	-	-	text	**Clock Synchronisation from Instation** Displays the last time at which the Outstation was synchronised by the Instation. When viewing the last synchronisation time using a display width of 20 characters or wider, then the display show the date and time of day on the one line. If the display width has been reduced to 14 characters, then the ‘+’ key can be used to view the date and then the day of the week.	RO

13.15 FLOW FACILITY COMMAND TABLE

Code	Major Index	Minor Index	Data Range	Description And Remarks	Access Level
FOC	-	0 – 15	0 – 65535	**Flow Count** The flow count value prior to applying the smoothing algorithm	RO
FOD	-	0 – 15	0 – 65535	**Flow Down Threshold** The down threshold of the flow detector, shown as a count value	RO
FOF	-	0 – 15	0 – 100	**Flow Smoothing Factor** The percentage of the flow count average that is used to calculate the new flow average	RO
FOH	-	0 – 1	8 bits binary	**Flow High** Shows 16 flow detectors, 1 = High Threshold last achieved, 0 = Low Threshold last achieved (Hysteresis). Inverse of Flow Low. Index 0 shows bits 0 – 7, index 1 shows bits 8 – 15	RO
FOL	-	0 - 1	8 bits binary	**Flow Low** Shows 16 flow detectors, 1 = Low Threshold last achieved, 0 = High Threshold last achieved (Hysteresis). Inverse of Flow High. Index 0 shows bits 0 – 7, index 1 shows bits 8 – 15	RO
FOP	-	0 – 15	0 – 100	**Flow Count Period** Time in minutes, over which to calculate flow	RO
FOS	-	0 – 15	0 – 65535	**Smoothed Flow Result** The smoothed detector flow value	RO
FOU	-	0 – 15	0 – 65535	**Flow Up Threshold** The up threshold of the flow detector, shown as a count value	RO

13.16 OCCUPANCY FACILITY COMMAND TABLE

Code	Major Index	Minor Index	Data Range	Description And Remarks	Access Level
OCC	-	0 – 15	0 – 65535	**Occupancy Count** The time in 10ths of a second that the detector is occupied prior to smoothing	RO
OCD	-	0 – 15	0 – 100	**Occupancy Down Threshold** The down threshold of the occupancy detector, shown as a percentage	RO
OCF	-	0 – 15	0 – 100	**Occupancy Smoothing Factor** The percentage of the occupancy count that is used to calculate the new occupancy average	RO
OCH	-	0 - 1	8 bits binary	**Occupancy High** Shows 16 occupancy detectors, 1 = High Threshold last achieved, 0 = Low Threshold last achieved (Hysteresis). Inverse of Occupancy Low. Index 0 shows bits 0 – 7, index 1 shows bits 8 – 15	RO
OCL	-	0 - 1	8 bits binary	**Occupancy Low** Shows 16 occupancy detectors, 1 = Low Threshold last achieved, 0 = High Threshold last achieved (Hysteresis). Inverse of Occupancy High. Index 0 shows bits 0 – 7, index 1 shows bits 8 – 15	RO
OCP	-	0 – 15	0 – 100	**Occupancy Count Period** Time in minutes, over which to calculate occupancy	RO
OCS	-	0 – 15	0 – 100	**Smoothed Occupancy Result** The smoothed detector occupancy percentage	RO
OCU	-	0 – 15	0 – 100	**Occupancy Up Threshold** The up threshold of the occupancy detector, shown as a percentage	RO

13.17 OMCU EVENT AND SWITCH OVERRIDE COMMAND TABLE

13.17.1 OMCU Events Commands

Code	Major Index	Minor Index	Data Range	Description And Remarks	Access Level
EVA	-	0 – 15	0 - 255	**OMCU Events Delay Time Active** Time (in minutes) to debounce event going active, before logging as active	RO
EVI	-	0 – 15	0 – 255	**OMCU Events Delay Time Inactive** Time (in minutes) to debounce event going inactive, before logging as inactive	RO
EVS	-	0 – 1	8 bits binary	**OMCU Event Status** Shows 16 OMCU events, 1 = active, 0 = inactive. Index 0 shows bits 0 – 7, index 1 shows bits 8 – 15	RO

13.17.2 Switch Override Commands

Code	Major Index	Minor Index	Data Range	Description And Remarks	Access Level
CSO	-	0 - 1	8 bits binary	**Current Switch Override -** Shows 16 switch overrides, 1 = active, 0 = inactive. Index 0 shows bits 0 – 7, index 1 shows bits 8 – 15	RO

13.18 VEHICLE CLASSIFIER COMMAND TABLE

13.18.1 Vehicle Classifier Common Configuration

Code	Major Index	Minor Index	Data Range	Description	Access Level
VCC	-	0	0 – 4	**Number of Sites** Total number of loop sites	RO
		1	0 or 1 – 255	**Maximum Presence Time** The time in minutes after which continued loop activation generates a vehicle presence loop fault. 0 = disable the loop DFM	
		2	0 or 1 – 255	**Maximum Absence Time** The time in hours after which continued loop deactivation generates a vehicle absence loop fault. 0 = disable the loop DFM	
		3	0 or 1 – 32	**Loop Pair Fault Detection Threshold** The number of consecutive vehicle detections counted on either the upstream or the downstream loop to cause a loop pair fault to be generated. 0 = loop pair fault algorithm disabled.	
		4	0 or 1 - 32	**Loop Pair Fault Clearance Threshold** The number of (not necessarily consecutive) vehicle detections counted by both upstream and downstream loops that must be exceeded to cause a loop pair fault clearance to be generated. 0 = loop pair fault algorithm disabled.	

13.18.1.1 Vehicle Classifier Loop Configuration

Code	Major Index	Minor Index	Data Range	Description	Access Level
VLC	0 – 31 Loop number	0	0 – 255	**Loop Inputs** 0 – 47 = Input on 1st I/O card 48 – 95 = Input on 2nd I/O card 96 – 143 = Input on 3rd I/O card 255 = Loop not used	RO
		1	0 – FF	**Loop Configuration Instance** Bit 0 Loop Present Flag Bits 1 to 3 Site Number Bits 4 to 6 Lane Number Bit 7 Upstream Loop Flag where : Loop Present Flag : (0) = loop not in use or non-existent (1) = loop is present Site Number: Number of the site that contains the loop [1 – 4]. Lane Number: Number of the lane that contains the loop [0 – 7]. Upstream Loop Flag : (0) = downstream loop (1) = upstream loop or only loop	

13.18.1.2 Vehicle Classifier Output Action List

Code	Major Index	Minor Index	Data Range	Description	Access Level
VOA	0 – 31 Output action number	0	0 – 2	**Output Action Type** 0 = Output activation without confirmation 1 = Output activation with confirmation 2 = Transmit message on communications link	RO

If Output Action Type is 0 or 1 then the following data is displayed.

VOA	0 – 31 Output action number	1	0 – 255	**Activation Delay** The total number of seconds that must elapse before the outputs are activated.	RO
		2	1 – 255	**Activation Duration** The total number of seconds that the outputs are to be activated.	
		3	0 – 5 or 255	**Port A** Port number corresponding to one of the total number of 8-bit ports on one or more IO cards. Ports 0 and 1 are on the 1st IO card, ports 2 and 3 are on the 2nd IO card, ports 4 and 5 are on the 3rd IO card. 255 = port not defined.	
		4	0 – FF	**Mask A** Mask value applied to the output port in Port A. A bit set to a 1 indicates that the output is to be activated. A bit set to a 0 indicates that the output is to be ignored.	
		5	0 – 5	**Port B** See port A above.	
		6	0 - FF	**Mask B** Mask value applied to the output port in Port B. A bit set to a 1 indicates that the output is to be activated. A bit set to a 0 indicates that the output is to be ignored.	

If Output Action Type is 2 then the following data is displayed.

VOA	0 – 31 Output action number	1	0 – 255	**Activation Delay** The total number of seconds that must elapse before the first transmission message is sent.	RO
		2	1 – 255	**Activation Duration** The total number of seconds that must elapse before the second transmission message is sent.	
		3	0 – 4 or 255	**Transmission Message ID** Identifies the message pair to be transmitted on the transmission communications link. 255 = no message pair selected	
		4	0 – 11 or 250	**Transmission Communications Link** Indicates on which communications link the messages identified by Transmission Message ID are to be transmitted. 0 – 11 = RS485 serial port 250 = MCE141 port 255 = no port selected	

13.18.1.3 Vehicle Classifier Site Parameters

Code	Major Index	Minor Index	Data Range	Description	Access Level
VSP	0 – 3 Site number	0	0 – 255	**Loop Spacing** Distance in 0.01m increments that added to the minimum loop spacing is the loop spacing for all loop pairs at the site. The minimum loop spacing is 2.5m.	RO
		1	0 – 255	**Loop Length** Length in 0.01m increments that added to the minimum loop length is the distance from the upstream edge to the downstream edge of all loops at the site. The minimum loop length is 1.0m.	
		2	1 – 8	**Number of Lanes** The number of lanes at the site.	

Code	Major Index	Minor Index	Data Range	Description	Access Level
		3	0 – 1	**Logging Control Byte 0** Bit 0 = Enable / Disable Traffic Data reporting. Bit set to a 1 indicates that the control is enabled. All other bits (bits 1 to 7) are set to zero.	
		4	0 – FF	**Logging Control Byte 1** Controls whether VC events are to be logged for a given lane at the site. Bit 0 = Logging enable for lane 0 : Bit 7 = Logging enable for lane 7 Bits 0 to 7 set to a 1 indicate logging enabled for the corresponding lane. If the lane is not defined at the site, the unused bits are set to 0.	
		5	0 – 1F	**Logging Control Byte 2** Controls which data is to be included in all VC events for the site when logging of VC events is enabled via logging control #1. Bit 0 = Vehicle type Bit 1 = Vehicle length Bit 2 = Vehicle speed Bit 3 = Vehicle headway Bit 4 = Output action Bits 0 to 4 set to a 1 indicates the corresponding data item is included in all VC events for the site. Bits 5 to 7 are set to 0.	

13.18.1.4 Vehicle Classifier Transmission Messages

Code	Major Index	Minor Index	Data Range	Description	Access Level
VTM	0 – 4 Message pair	0 - 1	See note	**Transmission Message** Transmission messages are grouped in pairs. A message consists of 40 bytes of binary data that are selected for transmission via one of the available serial communications links when a vehicle satisfies a detection condition that specifies an output action identifying a transmission message. The first byte of the message is the length of the message in bytes (not including the message length byte) [1-39]. Message length byte set to 0 for no message.	RO

Note: Message bytes that are non-printable i.e. have a binary value in the range 0 to 31 or 127 to 255 are displayed as \xx where xx is the ASCII hexadecimal representation of the message byte.

Message bytes that are printable i.e. have a binary value in the range 32 to 126 are displayed as the ASCII representation.

For example:

The 14 byte message “Mickey Mouse” + 2 bytes of CRC 1245 would be displayed on the handset as follows – VTM x y:\0EMickey Mouse\12E

13.18.1.5 Vehicle Classifier Confirmation Fail Parameters

Code	Major Index	Minor Index	Data Range	Description	Access Level
VCF	-	0	0 – 255	**Confirmation Fail Time** Time in seconds for which at least one confirmation input is inactive before a confirmation fault report is generated [1-255]. 0 = input confirm monitoring is disabled.	RO

Code	Major Index	Minor Index	Data Range	Description	Access Level
VCF	-	1	0 – 255	**Confirmation Fail Clearance Time** Time in seconds for which all confirmation inputs must be active before a confirmation fault clearance report is generated [1-255]. 0 = input confirm monitoring is disabled	RO
		2	0 – 2	**Confirmation Fail RRB** Urgency setting for confirmation fault and confirmation fault clearance reports i.e. not reported [0], reported on interrogation only [1] or urgently reported [2].	

13.18.1.6 Vehicle Classifier Traffic Data Parameters

Code	Major Index	Minor Index	Data Range	Description	Access Level
VTD	-	0	0 – F	**Statistics Selection** Indicates which information types each TD event contains. Can be one or more of the following (appropriate bit set to 1 to indicate statistic is present in TD event) : Bit 0 = Average speed Bit 1 = All configured statistic categories. There is a maximum of 16 categories Bit 2 = Average headway Bit 3 = Average occupancy Unused bits 4 to 7 are set to 0.	RO
		1	0 – 1	**Lane / Site Reporting** Indicates whether the TD event contains average speed, headway and occupancy statistics collected on a lane or a site basis. 0 = Site 1 = Lane	

Code	Major Index	Minor Index	Data Range	Description	Access Level
		2	1 - 60	**Averaging Period** Indicates the period over which speed, headway and occupancy statistics are collected before averaging occurs. The value is a number of minutes.	

13.18.1.7 Vehicle Classifier Speed Bands

Code	Major Index	Minor Index	Data Range	Description	Access Level
VSB	-	0 - 6	0 – 255	**Speed Band** The speed of the vehicle in kph. Counts any vehicle whose speed is greater than the speed in the previous band definition (if any) and less than or equal to this speed. Set to 0 if band is not configured.	RO

13.18.1.8 Vehicle Classifier Speed Display

Code	Major Index	Minor Index	Data Range	Description	Access Level
SDF	-	-	0 – 1	**Speed Display Format** Determines in which format the vehicle speed is displayed by the OLG handset command when a VC or a TD event is read from the Operations Log. 0 = kph 1 = mph (default)	Maint

13.18.1.9 Vehicle Classifier Vehicle Type Categories

Code	Major Index	Minor Index	Data Range	Description	Access Level
VVT	0 – 15 Vehicle Type	0	Up to 20 ASCII chars 0 – 9 and A – F	**Category Text** ASCII text string identifying the type of vehicle being classified in the associated category. The first byte of the string contains the length of the string in bytes [0-19] (not including the length byte). This text is used by the OLG handset command when a VC event is read from the Operations Log.	RO
		1	0 - 255	**Vehicle Length** The length of the vehicle in 0.1m units. Counts any vehicle that is greater than the length in the previous category definition (if any) and less than or equal to this length. Set to 0 if the category is not configured.	

13.18.1.10 Vehicle Classifier Test Message

Code	Major Index	Minor Index	Data Range	Description	Access Level
VRX	-	0	0 – 3	**Site Number** Site number at which vehicle is detected.	Maint
		1	0 – 7	**Lane Number** Lane number at which vehicle is detected.	
		2	0 – 15	**Vehicle Type** Identifies the vehicle type.	
		3	0 – 2550	**Vehicle Length** Vehicle length in 0.01m units.	
		4	0 – 255	**Vehicle Speed** Vehicle speed in kph.	
		5	0 – 255	**Vehicle Headway** Vehicle headway in 0.1s units.	

The above test message is sent when the VRC command is assigned a count.

Code	Major Index	Minor Index	Data Range	Description	Access Level
VRC	-	-	0 - 65535	**Test Message Receive Count** Repeats the VRX command for the given count. Allows the simulation of a large number of vehicles for test purposes. .	Maint

13.18.1.11 Vehicle Classifier Detect Condition Event Logging

Code	Major Index	Minor Index	Data Range	Description	Access Level
VDE	-	0	0 - FFFF	**DC Event Logging** Identifies the detect conditions for which a DC event is logged when the detection condition is satisfied. Bit set to a 1 indicates event logged. The least significant bit corresponds to detect condition 0; the most significant bit corresponds to detect condition 15.	RO
		1	0 - FFFF	**VC Event Logging** Identifies the detect conditions for which a VC event is logged when the detection condition is satisfied. Bit set to a 1 indicates event logged. The least significant bit corresponds to detect condition 0; the most significant bit corresponds to detect condition 15.	

13.18.1.12 Vehicle Classifier Detect Condition Statistic Category Map

Code	Major Index	Minor Index	Data Range	Description	Access Level
VSM	-	0 – 31	0 – 15	**Statistic Category** Identifies the statistic category that is to be incremented each time the corresponding detection condition occurs (assuming counting for the detection condition is enabled). 255 = no statistic category	RO

13.18.2 Operations Log Capacity

The Operations Log holds approximately 12,000 VC.

The following table provides a summary of Operations Log capacities containing TD events only for typical configurations assuming a 1 minute averaging period. For other averaging periods the log capacity is increased.

Number of Statistic Categories	16	16	16	1	8	1	1
Speed (Yes=1 / No = 0)	1	1	1	0	0	0	1
Occupancy (Yes=1 / No = 0)	1	1	1	0	0	0	0
Headway (Yes=1 / No = 0)	1	1	1	0	0	0	0
Number of Lanes (Maximum)	8	8	1	8	8	1	8
Number of Sites (Maximum)	4	1	1	4	4	1	4
Reporting (Lane = 0 / Site = 1)	0	1	0	0	1	0	1
Event Size (Bytes)	76	48	48	14	28	14	22
Log Capacity (Hours)	52	83	83	285	142	285	181
Number of Log Entries	3157	5000	5000	17142	8571	17142	10909

To derive the log capacity in hours for alternative averaging periods, multiply the appropriate log capacity in the above table by the alternative averaging period.

13.18.3 Operations Log Display Formats (OLG)

13.18.3.1 VC Event

The following defines the handset output format for a VC event when the OLG command is used.

Field	Max Size	Format	Range
TIMESTAMP	18	See below	See below
" L:"	3	Text	
SITE / LANE	2	Hexadecimal	0 – 3 / 0 – 7
" "	1	Text	
VEHICLE TYPE	Variable	Text	Depends on configured text.
" "	1	Text	
VEHICLE LENGTH	5	Decimal	0.0 – 25.5
"m "	2	Text	
VEHICLE SPEED	3	Decimal	0 – 255
"kph " or "mph"	4	Text	
VEHICLE HEADWAY	4	Decimal	0.0 – 25.5
"s O:"	4	Text	
OUTPUT ACTION	8	Hexadecimal	0 - FFFFFFFF The least significant bit corresponds to output action 0; the most significant bit corresponds to output action 31.

NOTE: A vehicle longer than 25.5m is limited to 25.5m in the VC event. A headway of greater than 25.5s is limited to 25.5s.

Examples

23-JAN-02 16:30:00 L:12 CAR 5.23m 50kph 6.2s O:1
A vehicle classed as a CAR on site 1 lane 2 was recorded with a length of 5.23m, a speed of 52kph and a headway of 6.2s. The detection invoked output action 0.

23-JAN-02 16:32:00 L:12 BIG THING 12.01m 70kph 25.5s O:100F
A vehicle classed as a BIG THING on site 1 lane 2 was recorded with a length of 12.01m, a speed of 70kph and a headway of 25.5s or more. The detection invoked output actions 0, 1, 2, 3 and 15.

NOTE: The above display format assumes all data fields are present in the VC event. The stored data content of the VC event is configurable so that not all of the above fields may be displayed by the OLG handset command for a given VC event.

13.18.3.2 DC Event

The following defines the handset output format for a DC event when the OLG command is used.

Field	Max Size	Format	Range
TIMESTAMP	18	See below	See below
“ DC:”	4	Text	
DETECT CONDITION	1	Decimal	0 – 31

23-JAN-02 16:30:00 DC:1

13.18.3.3 TD Event

The following defines the handset output format for a TC event when the OLG command is used.

Field	Max Size	Format	Range
TIMESTAMP	18	See below	See below

followed by the following (assuming there are statistic categories present):

“ ”	1	Text	
STATISTIC CATEGORY MASK	4	Hexadecimal	0 – FFFF The least significant bit corresponds to category 0, the most significant bit corresponds to category 15

followed by up to 16 statistic categories (there may be none as dictated by the configuration):

" "	1	Text	
STATISTIC CATEGORY	5	Decimal	0 – 65535

followed by up to 8 locations supplied with average speed, average headway and average occupancy values:

" L:"	3	Text	
SITE / LANE	2	Hexadecimal	0 – 3 / 0 – 7
" "	1	Text	
AVERAGE SPEED	3	Decimal	0 – 255
"kph " or "mph "	4	Text	
AVERAGE HEADWAY	4	Decimal	0.0 – 25.5
"s "	2	Text	
AVERAGE OCCUPANCY	3	Decimal	0 – 100
"%"	1	Text	

NOTE: All, some or none of the speed, headway and occupancy data values may be present as dictated by the configuration.

Examples

23-JAN-02 16:30:00 1 4563 L:00 62kph 8.3s 11% L:10 74kph 5.1s 34%
Statistics category 0 holds a count of 4563. Site 0 lane 0 contains average vehicle speed, headway and occupancy of 62kph, 8.3s and 11% respectively. Site 1 lane 0 contains average vehicle speed, headway and occupancy of 74kph, 5.1s and 34% respectively.

23-JAN-02 16:32:00 L:00 40mph L:01 52mph
Site 0 lane 0 contains average vehicle speed of 40mph. Site 0 lane 1 contains average vehicle speed of 52mph.
There are no statistic categories or average vehicle headway and occupancy values.

23-JAN-02 16:30:00 C00F 1 0 1202 432 6565 232
Statistics categories 0, 1, 2, 3, 14 and 14 holds counts 1, 0, 1202, 432, 6565 and 232 respectively.
There are no average vehicle speed, headway and occupancy values.

13.19 UTMC GENERAL COMMAND TABLE

Code	Major Index	Minor Index	Data Range	Description	Access Level
IPM (IPR=2 to activate)	-	0	Number	**IP Outstation Address Manual** configuration. Number is of the form: xxx.xxx.xxx.xxx Default – not specified.	Maint
		1	Number	**IP Gateway Address** configuration. Number is of the form: xxx.xxx.xxx.xxx Default – not specified.	
		2	Number	**IP Broadcast Address** configuration. Number is of the form: xxx.xxx.xxx.xxx. Usually 255.255.255.255 Default – not specified.	
		3	Number	**IP Subnet Mask** configuration. Number is of the form: xxx.xxx.xxx.xxx Usually 255.255.0.0 or 255.255.255.0 Default – not specified.	
		4	Number	**Server IP Address** configuration. Not Used.	

Code	Major Index	Minor Index	Data Range	Description	Access Level
IPR	-	-	1 or 2	**IP Reset Command** Used to initialise communications with the Instation via the Ethernet port. For networks with automatic address allocation, use **IPR=1**. For networks with manual address allocation, enter address using **IPM 0** etc and then use **IPR=2**. **IPR=1** initiates an automatic BOOTP sequence across the network. If the request is not successful it will retry automatically every 10 minutes (unless set to a different interval by the BPR command). **IPR=2** activates the manual IP address setting entered by the **IPM** command.	Maint
IPB	-	-	ASCII Name	**BOOTP Server Name** Defines the name of the server which will give the outstation an IP address in response to a BOOTP message (initiated by **IPR=1**).	Maint
BPR	-	-	Time in minutes	**BOOTP retry timeout** Sets the BOOTP retry time used by IPR=1. Factory setting is 10 minutes.	Maint
OID	-	-	ASCII Outstation ID	**Outstation ID** string Defines the outstation identity to the system as a text string e.g. X18120. The identity can be allocated by the system when communication is first established, or it can be set by the engineer when the unit is installed. 32 characters maximum, including the <space> character. Default: (unset)	Maint
LDV	-	-	-	See page 313.	Maint
IPA	-	0 - 4	Number	**IP Address** Displays the actual IP address being used by the outstation following IPR=1 or IPR=2 commands. Format as **IPM** above.	RO

Code	Major Index	Minor Index	Data Range	Description	Access Level
LOC	-	-	ASCII Location	**Outstation Location** Displays the location of the outstation as a text string e.g. PINHOE, ST MARKS. The information may be set up by the Instation so that the engineer can confirm the location. 64 characters maximum. Default: (unset)	RO
MAC	-	-	HEX MAC address	**Ethernet MAC Address**: **xx-xx-xx-xx-xx-xx** Displays the Ethernet MAC Address of the outstation, as defined in a protected section of the processor card flash memory. The address is allocated during manufacture.	RO
LIF	-	-	ASCII Facilities code	**Licensed Facilities Code** Set the licensed facilities code, comprising a 6-character alpha/numeric string.	Maint
LIN	-	-	nnnn nnnn Licence code	**Licence Number Code** Set the licence number code, comprising two 4-digit numbers separated by a space. Values for **LIF** and **LIN** can be obtained from Siemens Poole. The serial number of the CPU card will be required (see HIC command). If an outstation is replaced, then new LIN and LIF numbers will be required for the new CPU card. **LIN=9999 9999** can be used to temporarily enable facilities while a permanent licence number is obtained. The temporary licence will expire after 7 days.	Maint
HIC	-	-	number	**Hardware Identity Code** Displays the identity number assigned to the CPU card in production. The value is the same as the bar code serial number on the CPU card.	RO
KIC	-	-	text	**Kernel Identity Code** Displays the issue string of the eCos operating system kernel.	RO

13.20 UTMC OTU COMMAND TABLE

13.20.1 UTMC OTU Communication Set-Up Commands

Code	Major Index	Minor Index	Data Range	Description	Access Level
GCW	-	0	0 – 8 Control	**No. of control words** Configures the number of bytes of control data sent each second from the UTC Instation. The index of zero is used for compatibility with the TC12 GCW command. Default: (2)	Maint
GRW	-	0	0 – 16 Reply	**No. of reply words** Configures the number of bytes of reply data sent each second to the UTC Instation. The index of zero is used for compatibility with the TC12 GRW command. Default: (6)	Maint
GOE	-	-	0 or 1 Enable	**OTU Enable** Causes the OTU UTC control and reply function to be enabled (1) or disabled (0). The facility should not be enabled until all the required configuration items have been set up and checked. **GOE:245** indicates that the licence code is invalid (see **LIN** & **LIF**) **GOE:255** indicates that the operating mode is incorrect (check **LDV** & **OPM**)	Maint

13.20.2 UTMC OTU Control and Reply Bit Allocation Commands

Code	Major Index	Minor Index	Data Range	Description	Access Level
GSA	-	0 to 23 SCOOT Loop	0 to 151 Input **Note** GSA references inputs from 0, ie GSA 0 = 0 allocates SCOOT loop 0 to input 1	**SCOOT Loop Input Allocation** For each SCOOT loop, enter the number of the input to which the SCOOT detector is connected or 255 for unused. 0 to 47 – 1st I/O card inputs 48 to 95 – 2nd I/O card inputs 96 to 143 – 3rd I/O card inputs 144 to 151 – CPU card inputs Default: 255	Maint
LDV	-	-	5 or 8	**Load Default Values for OTU** **LDV=5** - Load the default values for a freestanding UTMC OTU outstation. **LDV=8** - Load the default values for a semi-integral UTMC OTU outstation, using a serial link to communicate with the ST700/800 controller. See LDV command on page 261 for other values. Where the outstation is only required to operate as an OTU it should be initialised using **INI=1** prior to the use of this command.	Maint
GUD	-	0 - 15 U/D number	0 – 151 Input number	**U/D Loop Allocation** (255) Unidirectional loop allocation on a <u>free standing</u> OTU. For each unidirectional unit (0 to 15), enter the input to which the normal direction loop connects (the reverse direction loop is connected to the next input after the normal direction loop) or 255 for unused. 0 to 47 – 1st I/O card inputs 48 to 95 – 2nd I/O card inputs 96 to 143 – 3rd I/O card inputs 144 to 151 – CPU card inputs Defaults: 255	Maint

Code	Major Index	Minor Index	Data Range	Description	Access Level
GRL	0 – 15 Reply byte	0 – 7 Reply bit	0 – 255 Function	**OTU Reply Bit Definition** For each reply byte (0 to 15) set up the function of each bit (0 to 7) in this reply byte. This command is therefore repeated up to eight times for each bit in a reply byte. The <function> field defines the source that sets the bit, or in the case of SCOOT loops a group of four bits – see table starting on page 318 for values. Defaults: 0	Maint
GCN	0 – 15 Control byte	0 – 7 Control bit	ASCII name	**Control Bit Names** This command displays the name assigned to each control bit by the UTC Instation. If this facility is supported by the UTC Instation, the data is loaded automatically when communication is first established.	RO
GRN	0 – 15 Reply byte	0 – 7 Reply bit	ASCII name	**Reply Bit Names** This command displays the name assigned to each reply bit by the UTC Instation. If this facility is supported by the UTC Instation, the data is loaded automatically when communication is first established.	RO
TCA	-	-	0 – 49 TC output	**Transmit Confirm Allocation**. The specified output line is activated while valid UTC control messages are being received. A value of 255 disables the function. 0 to 15 – 1st I/O card outputs 16 to 31 – 2nd I/O card outputs 32 to 47 – 3rd I/O card outputs 48 & 49 – CPU card outputs Default: 255	Maint

Code	Major Index	Minor Index	Data Range	Description	Access Level
GIA	0 – 15 CQO unit	0	0 – 151 Input	**Count, Queue & Occupancy Input Configuration** **Input Allocation:** Configure the input line number for the count, queue or occupancy unit. Note: For N + 1 sites the input line allocation represents the kerbside lane loop. The remaining loops are connected consecutively to the next two or three inputs for two or three lane sites respectively. If required a unidirectional function may be allocated to the last loop using the **GUD** command. Default: 0	Maint
		1	0 – 7 Function	**Unit Configuration** Configure the function for the unit as one of the following: **0** = Count/Occupancy/Queue unit not configured **1** = N count unit (single lane) **2** = 2 lane N + 1 count unit **3** = 3 lane N + 1 count unit **4** = N occupancy unit (single lane) **5** = 2 lane N + 1 occupancy unit **6** = 3 lane N + 1 occupancy unit **7** = Queue unit Default: 0	
GAQ	-	0 – 15 CQO unit	0 – 255 Queue active time (secs)	**Queue Active Time** To specify the time in seconds that a configured queue unit input must be active before its output becomes active. Default: 0	Maint
GIQ	-	0 – 15 CQO unit	0 – 255 Queue inactive time (secs)	**Queue Inactive Time** To specify the time in seconds that a configured queue unit input must be inactive before its output (which was previously active) is cleared. Default: 0	Maint

Code	Major Index	Minor Index	Data Range	Description	Access Level
GCF	-	0 – 15 Count unit	1 – 8 Weighting factor	**Count Unit Weighting Factor** The weighting factor is used to define the number of counts required to cause the reply bit to change state. The data is selected using the table below. The value used depends on the maximum vehicle flow rate at each count site. Generally a weighting factor of approximately twice the maximum flow will be required. Weighting factor Count for Reply Bit Change 1 - 1 2 - 2 3 - 4 4 - 8 5 - 16 6 - 32 7 - 64 8 - 128 Default: 5	Maint
GOF	-	0 – 15 Occ unit	1 – 8 Weighting factor	**Occupancy Unit Weighting Factor** This is used to define the number of internal counts required to cause the reply bit to change state. The value is selected using the table above (see **GCF** command). The internal count rate is 25 Hz for 100% occupancy so a weighting factor of 6 is normally used, giving a change of state every 1.28 seconds max. Default: 6	Maint
GIS	-	0 – 7 Input Port	00000000 - 11111111	**Input Inversion** Enables any of the inputs to be inverted. This facility is required to cater for detectors with normally open output contacts. Default: 00000000	Maint
DTA	-	0	2 – 255 mins	**DFM Stuck Active** The limit specifies the time in MINUTES. The index of 0 is for future use as group number. Default: 30	Maint

Code	Major Index	Minor Index	Data Range	Description	Access Level
DTI	-	0	2 – 255 0.1 hrs	**DFM Stuck Inactive Time** Used to set the required stuck inactive time limit for DFM. The limit specifies the time in 0.1 HOUR units. The index of 0 is for future use as group number. Default: 180 (i.e. 18 hours)	Maint
DEA	0 – 7 Input Port	0 – 7 Port Bit	0 or 1	**Dual DFM Enable**. Used to enable “dual” DFM monitoring on the specified input. The default value for all inputs is 0, which indicates that no DFM is required on those inputs. To start the monitoring of an input, use this command to enable DFM and set up **DTA** and **DTI** to the desired times.	Maint
DEI	0 – 7 Input Port	0 – 7 Port Bit	0 or 1 Disable/Enable	**Single DFM Enable** Defines inactive timeout only. A 1 is used to enable “single” DFM monitoring on the specified input. The command operates as for **DEA**, but the **DTI** timeout is used for both the stuck active and stuck inactive checks. This would be configured on inputs which can remain active for greater than the **DTA** timeout. Default: 0	Maint
GLT	-	-	0 – 143 Input number	**Lamp Test** Setting this value to a valid input number provides a lamp test facility (for use with a green wave box). If the allocated input is active (i.e. “1”) then all the OTU output relays are energised. Default: 255 – lamp test facility disabled.	Maint

Code	Major Index	Minor Index	Data Range	Description	Access Level
GMO			0-255	Assigns a bit position in the UTC control word to indicate MOVA fallback. Condition '1' will enable MOVA to send force bits to the traffic controller in place of the UTC control bits. Condition '0' will select normal UTC operation i.e. all the UTC control bits will be sent to the traffic controller Default value is 255 indicating that the function is disabled.	Maint
GFT	-	-	4 - 60	Overrides default UTMC OTU timeout of 3 seconds to between 4 and 60 seconds.	Maint

Data Value	Meaning for GRL Command
0	The reply bit is driven directly from the corresponding input, starting from the first BUS/MOVA I/O card detected.
1 to 12	Not used (was Red Lamp Monitor groups 0 to 3 on TC12)
13	OTU handset attached
14	OTU Fault present in Log
15 to 20	Not used (was count/queue/occ units on TC12 – use 60 etc)
21 to 32	Not used (was SCOOT loops on TC12 – use 100 etc)
33 to 44	Not used (was Red Lamp Monitor groups 4 to 7 on TC12)
45	Any lamp failure (future use with OMU lamp monitor)
46	Any Red failure (future use with OMU lamp monitor)
	Note: These bits are also set if the lamps are switched off at the controller.
47	combined Direct input or OTU fault present – used to provide a single reply bit for controller or OTU fault
48	DFM failure indication
49	unit 0, HIOCC alarm bit,
50	unit 1, HIOCC alarm bit,
51	unit 2, HIOCC alarm bit,
52	unit 3, HIOCC alarm bit,
53	unit 4, HIOCC alarm bit,
54	unit 5, HIOCC alarm bit,
55	unit 6, HIOCC alarm bit,
56	unit 7, HIOCC alarm bit.
57	Selects two consecutive reply bytes for the return of environmental sensor or SIETAG reader data. Must be entered on bit 0 of the first of the two reply bytes.

Data Value	Meaning for GRL Command
60	Count/Occupancy/Queue Unit 0 output
61	Count/Occupancy/Queue Unit 1 output
62	Count/Occupancy/Queue Unit 2 output
63	Count/Occupancy/Queue Unit 3 output
64	Count/Occupancy/Queue Unit 4 output
65	Count/Occupancy/Queue Unit 5 output
66	Count/Occupancy/Queue Unit 6 output
67	Count/Occupancy/Queue Unit 7 output
68	Count/Occupancy/Queue Unit 8 output
69	Count/Occupancy/Queue Unit 9 output
70	Count/Occupancy/Queue Unit 10 output
71	Count/Occupancy/Queue Unit 11 output
72	Count/Occupancy/Queue Unit 12 output
73	Count/Occupancy/Queue Unit 13 output
74	Count/Occupancy/Queue Unit 14 output
75	Count/Occupancy/Queue Unit 15 output
76	Confirm bit from the ST700/800 via the enhanced serial link.
77	Controller ready bit from the ST700/800 via the enhanced serial link.
78	Assign bit to MOVA UTC fallback reply MR function.
100 to 199	Mapped inputs: The reply bit is driven from the specified input, where 100 to 147– 1st I/O card inputs 148to 195– 2nd I/O card inputs
200*[1]	Scoot loop 0 output
201	Scoot loop 1 output
202	Scoot loop 2 output
203	Scoot loop 3 output
204	Scoot loop 4 output
205	Scoot loop 5 output
206	Scoot loop 6 output
207	Scoot loop 7 output
208	Scoot loop 8 output
209	Scoot loop 9 output
210	Scoot loop 10 output
211	Scoot loop 11 output
212	Scoot loop 12 output
213	Scoot loop 13 output
214	Scoot loop 14 output
215	Scoot loop 15 output
216	Scoot loop 16 output
217	Scoot loop 17 output
218	Scoot loop 18 output
219	Scoot loop 19 output
220	Scoot loop 20 output
221	Scoot loop 21 output
222	Scoot loop 22 output
223	Scoot loop 23 output

Note: ***1**
SCOOT loop allocations **MUST** be on either bit 0 or bit 4 of a reply byte. The following three bits are automatically reserved for SCOOT, overriding the previous configuration for these bits, hence giving a total of four reply bits per SCOOT loop.

13.20.3 UTMC OTU Diagnostic Display Commands

Code	Major Index	Minor Index	Data Range	Description	Access Level
GCD	-	0 – 7 Control Byte	8 bits binary	**Control Byte Display** Displays the control data currently being received from the Instation in binary format.	RO
GDI	-	-	-	***Display Input*** Replaced by **DIP** (digital inputs) and **LIP** (logical inputs).	RO
GIU	-	0 -151 Input Bit	<input use>	**Display Input Use** Displays what facility is assigned to each input, e.g. **GIU 8:S2 –** indicates that input 8 has been assigned to Scoot unit 2. This command can be used to check the configuration of the inputs. For each input the command will display one or more assignments as shown in the table following.	RO
GRD		0 – 15 Reply Byte	8 bits binary	**Reply Byte Display** Displays the reply data currently being transmitted to the Instation in binary format.	RO
GCU	-	0 – 15 Flow Unit	8 bits binary	**Display Flow Unit Count** Displays the current count value for the selected flow counter.	RO
GOU	-	0 – 15 Occ Unit	8 bits binary	**Display Occupancy Unit Count** Displays the current value for the selected occupancy counter.	RO
GQU	-	0 – 15 Queue Unit	8 bits binary	**Display Queue Unit State** Displays the current state of the selected queue unit output (0 = queue inactive, 1 = queue active).	RO

Code	Major Index	Minor Index	Data Range	Description	Access Level
ERD	-	-	0 - 2	**Echo & Repeat Disable** **ERD=1** disable 'repeat'. **ERD=2** modifies the **GCU** and **GOU** display format to 3 digit decimal, with HEX CRC (using the UVMS 16bit Fletcher checksum). Default: 0	OP
GCT		0 – 6 Comms Diag	0 - 65535	**Comms Diagnostic Display** Displays diagnostic information on the communications received from the UTC Instation: **GCT 0 -** displays the count of good received messages **GCT 6 -** displays the number of times communications have been lost for more than 4 seconds. Other index values are unused for UTMC OTU.	RO

GIU Display	Meaning
'U#a' or 'U#u'	Input is assigned to the A loop or the U loop of U/D unit #.
'C#'	Input is assigned to Count Unit #
'O#'	Input is assigned to Occupancy Unit # <For N+1 count, or occupancy sites, the letters 'a' to 'd' are appended to identify up to four loops.>
'Q#'	Input is assigned to Queue Unit #
'H#'	Input is assigned to HIOCC Unit #
'S#'	Input is assigned to Scoot Unit #
'L#'	Input is assigned as a Mains state for sensor #

13.20.4 UTMC OTU Test / Maintenance Commands

Code	Major Index	Minor Index	Data Range	Description	Access Level
IPP	-	-	IP Address	**Test IP Address** Ping: **xxx.xxx.xxx.xxx** Internet Protocol address to be 'pinged' by the outstation in order to check network comms. Default: 0.0.0.0	Maint
IPC	-	-	0 - 65535	**Number of 'Pings'** **IPC** initiates IP network test by transmitting the specified number of 'ping' requests to the IP address defined by IPP at the rate of one per second. The display shows the number of 'pings' still to be sent and the response time for the previous request (or TIMEOUT if there was no response within a second). If the network address has not been initialised. Then the display will remain blank.	Maint
GIO	-	-	0 – 3	**Reply Data Override** **GIO=1** replaces the reply data with test data entered using the **GID** command. **GIO=2** sets the reply data to the inverse of the control data. **GIO=3** sets the reply data to copy the control data. The override can be disabled by entering **GIO = 0**. Default: 0	Maint
GID	-	0 – 15 Reply Byte	8 bits binary	**Reply Byte Test Pattern** Allows test data patterns for the reply bytes to be entered. The data is actually output when the override is enabled using the **GIO** command.	Maint
RFL	-	-	0 or 1	**Reset The OTU Fault Log** **RFL = 1** clears the OTU current fault log and extinguishes the fault LED provided that fault conditions are no longer present (historic fault log is unaffected). – NB: Only required to clear DFM	Maint

13.20.5 UTMC OTU Output Override Commands

Code	Major Index	Minor Index	Data Range	Description	Access Level
GOO	-	-	0 - 1	**Control Data Override** **GOO = 1** replaces the control data with test data entered using the **GOD** and **GTC** commands - see below. The override can be disabled by entering **GOO = 0** and is also removed when the '**GOT**' timeout has expired <see below>. The **GOO** command displays **GOO:2** whilst the override is active.	Maint
GOT	-	-	1 – 254 minutes 255 disable	**Disable Timeout** **GOT = 1-254** minutes, **GOT = 255** to disable timeout Display or change the timeout on the digital output override facility.	Maint
GOD	-	0 – 7 Control Byte	8 bits binary	**Control Byte Test Data** Allows the requested override data value of each control byte to be entered. The data is actually output when the override is enabled using the **GOO** command.	Maint
GTC	-	-	0 or 1 TC State	**Transmit Confirm Test State** Used in conjunction with the **GOO** command. Enables the state of the Transmit confirm output to be manually controlled.	Maint
GDO	-	0 – 7 Control Byte	8 bits binary	**Control Byte Override Value** Allows the default override value of each control byte to be entered. The data is only output when the override timeout expires. This command is only used where a VMS sign uses a "pulsed" interface (e.g. Dambach).	Maint

Code	Major Index	Minor Index	Data Range	Description	Access Level
GDT	-	-	1 - 254 Override Time (secs)	**Control Data Override Time** Set/display the time for which the override data is activated, before reverting to all zeros. This command is only used where a VMS sign uses a “pulsed” interface (e.g. Dambach). **GDT=255** no data activation time	Maint

13.20.6 UTMC OTU HIOCC Facility Commands

Code	Major Index	Minor Index	Data Range	Description	Access Level
GHA	-	0 – 7 Occ Unit Number	0 – 100 %	**Percentage Occupancy** Set/display the occupancy alarm threshold (0 - 100%), used to determine alarm conditions. Default: 100%	Maint
GHZ	-	-	0 – 255 Secs	**Zero Occupancy Time** Zero occupancy will be assumed after the pre-set time. Default: 8 secs	Maint
GHV	-	-	0 – 100 %	**Percentage Smoothed Occupancy High Level** Smoothed occupancy high value used for alarm detection. Default: 90%	Maint
GHL	-	0 – 7 Occ Unit Number	0 – 31 Input Bit	**HIOCC Loop Input Allocation** Assigns an input bit (0-31) for each HIOCC unit (or 255 to indicate that the unit is not configured). Default: 255	Maint
GHN	-	0 – 7 Occ Unit Number	1 – 10 Consec. Samples	**Consecutive Occupancy Samples** The number of consecutive occupancy samples used to determine if an alarm condition exists. Default: 3	Maint

Code	Major Index	Minor Index	Data Range	Description	Access Level
GHF	-	-	0 –100 Smooth Factor	**Occupancy Smoothing Factor** The smoothing factor used in calculating the new smoothed occupancy. This value represents actual smoothing factors of 0 to 1, i.e. the default value of 2 represents 0.02 for calculation purposes. Default: 2	Maint
GHC	-	-	0 – 100 Threshold	**Occupancy Clearance Threshold** The fixed clearance threshold is used to determine an alarm clearance condition in the event that the smoothed occupancy average is at an abnormal level prior to an alarm. Default: 70	Maint

13.20.7 UTMC OTU Environmental Sensor/SIETAG Interface Commands

Code	Major Index	Minor Index	Data Range	Description	Access Level
GEC	-	1 – 23 Channel Number	0 or 1 Enable / Disable	**Environmental Sensor Channel** Enable (**=1**) or disable (**=0**) the selected channel. Default: 0	Maint
GED	-	1 – 23 Channel Number	0 – 1023 Reply Data	**Environmental Sensor Reply Data** Set the reply data value for the selected channel. The display is cleared to zero when the data is processed. Values outside the above range are discarded. Default: 0	OP

13.20.8 UTMC OTU Engineering Commands

Code	Major Index	Minor Index	Data Range	Description	Access Level
SIP	0 – 9 Channel Number	0 – 9 Item	0 – 65535 Time (secs) or State	**Simulate Input** Simulate input for the selected channel. The **Item Index** is: - **0** – line number of input to simulate, 999 = channel not used. **1** – time delay in mS, 1 to 65535 **2** – state to set the input to, 0 or 1 **3** – time delay in mS, 1 to 65535 **4** – state to set the input to, 0 or 1 etc A time delay of 0 returns to the start of the simulation sequence on this channel and the simulation repeats indefinitely. Default: 0	Maint
SIE			0-1	1 = enable simulation mode 0 = disable simulation mode By setting SIE to 0 before setting up multiple simulation channels and then to 1 when they are configured the simulation starts all channels in synch.	

13.21 UTMC VMS COMMAND TABLE

13.21.1 UTMC VMS Common Configuration

Code	Major Index	Minor Index	Data Range	Description	Access Level
VMP	-	-	ASCII password	**VMS Outstation Password** Specified by the customer for remote access. 30 character limit Default: (unset)	Maint
VMD	-	-	1 – 240 secs	**Outstation Poll Delay.** Set the delay (in seconds) between each poll of the signs. Note: This option should be used with care. A delay of less than 8 secs. Can cause the VMS sign to produce false Status Reports. If there are lots of signs on a single RS485 channel then a large delay should be used (40+ secs.). Default: 10 secs	Maint
VMS	-	-	0 – 7 sign	**Enable VMS Sign** Use this command to set the number of signs that should be enabled. E.g. VMS=1 will enable just Sign 0, VMS=3 will enable Signs 0, 1 and 2. Default: 0	Maint
VMI			0 – 120 minutes	**VMS Inactivity Timeout** The time in minutes that must elapse without communication from the Siespace instation before the Outstation will stop communication with the signs.	Maint

13.21.2 UTMC VMS Sign Control Configuration

Code	Major Index	Minor Index	Data Range	Description	Access Level
VMN	-	0 – 7 sign	0 – 11 RS485 channel	**Sign RS485 Channel.** Set the channel that the selected sign should use. Default : 0	Maint

Code	Major Index	Minor Index	Data Range	Description	Access Level
VMH	-	0 – 7 sign	1 – 6 sign height	**Sign Height** Define the height (no. of rows) that each sign has. Default: 2	Maint
VMW	-	0 – 7 sign	1 – 100 sign width	**Sign Width** Define the width (no. of characters) of each sign. Default: 12	Maint
VML	-	0 – 7 sign	1 or 2 lanterns	**Sign Lanterns** Set to 1 if Lanterns are present, 2 if they are not. Default: 2	Maint
VMT	-	0 – 7 sign	ASCII	**Sign Type** Enter the type/location/title? of each sign. Any ASCII string – up to 100 characters. Default: (unset)	Maint
VMA	-	0 – 7 sign	1 – 254 RS485 address	**Sign RS485 Address** Set the address that each sign will be using. Entries 0 and 255 are recognised as invalid address numbers. Default: 0	Maint
VMV	-	0 – 7 sign	0 or 1 test	**Sign Test** Set to 1 to place the selected sign into test mode. This will display a basic test message that will override any messages sent from the Instation. Sign Display will show: "**SIGN n ON TEST**" (n = sign number) – row 1 "**hh:mm:ss**" (i.e. time) – row 2 Default: 0	Maint
VMM	0 – 7 sign	0 – 5 row	ASCII	**Show Sign Message** For each sign row (minor index) the message being displayed will be shown on the handset.	RO

13.22 GRAPHOS COMMAND TABLE

Code	Major Index	Minor Index	Data Range	Description	Access Level
CNT	-	0 – 5	0 – 65535	**Graphos Counts** 0 = loss of communications 1 = loss of modified config. 2 = no triggering at Master 3 = no triggering at Slave1 4 = no triggering at Slave2 5 = no triggering at Slave3	Maint
ENG	72 – 75	0 – 40 or 0 – 16	0 – 255	**Conditioning settings**	Maint
FLG	-	-	-	**Fault log with time stamp**	RO
FLT	-	-	-	Displays current faults: FLT: !GRF <fault data> See note 1 below	RO
GFR	-	-	4 – 10	**Master Control Board Flash Rate**	RO
GIP	-	0 – 3	-	**X4 inputs** (last 4 bits) from: 0 = Master Sign 1 = Slave 1 2 = Slave 2 3 = Slave 3	RO Values will be always zero
GMD	-	-	0 – 4	**Graphical Sign Mode** 0 = Graphos Facility Disabled 1 = Init Phase Started 2 = Awaiting response from Master Sign 3 = Awaiting completion of Init Phase 4 = Normal Operation	RO
GSP	-	0 – 3	0 – 4	**View pictures set**	RO
GTM	-	0 – 3	0 – 255	**Transmission msg data**	RO

Code	Major Index	Minor Index	Data Range	Description	Access Level
LED	0 – 3 Sign Number	0 – 31 LED String	0 – 255	**Status of the LED strings** A bit set to ‘1’ means a String fault. Major Index: 0 - Master Sign 1 - Slave1 Sign, etc. Minor Index: 0 - LDB1 port1 1 - LDB1 port2 2 - LDB1 port3 3 - LDB1 port4 4 - LDB2 port1 5 - LDB2 port2 ……………… 30 - LDB8 port3 31 - LDB8 port4	RO
LMD	-	-	0 – 2	**Master Control Board Mode** 0 = Mode Unknown 1 = Gemini Controlling Cluster 2 = Gemini Monitoring Cluster	RO
LSO	-	0 – 3	0 – 100	**Luminance Setting (%)**	RO
SGM	-	0 – 4 Sign Number	0 – 4	**Set Aspect / Graphic Symbol** 0 = All Signs 1 = Sign 1 2 = Sign 2 etc. Value assigned as follows : 0 = Blank 1 = Picture 1 etc.	Maint

Note 1: There are 3 bytes of fault data associated with Graphos failures.

The first byte indicates the sign number, i.e. 0 for failures reported by Gemini, 1 for failures reported by the Master, 2 for failures reported by Slave 1, etc.

The second byte gives the Fault Number:
Gemini failures
1 - Gemini Unit is unable to communicate with the Master Sign
2 - Master Sign has replied indicating the last set message was invalid
10 - Master Sign has replied with information from additional signs
LSCU failures
3 - LSCU radar has not triggered
4 - Voltage on LDB board is missing
5 - System error on LDB board
6 - Invalid picture number in last set message
7 - Ambient light sensor failure
8 - LED failure
9 - Incorrect picture being displayed

11 - Missing or defect LDB board

The third byte is only used with the ‘comms failure/power fail’ fault and it gives the Sign number that has lost the link, i.e., 1 indicates the loss between the Gemini and the Master, 2 indicates the loss between the Master and Slave 1, etc.
If the Sign Number is 1 then the loss of comms could be due to a power fail fault because the LSCU has no battery support where as the Gemini Unit has.
Once the link has been restored and comms is working again, this failure is cleared automatically.

Appendix A MOVA INSTALLATION SHEETS

A copy of this sheet should be completed for each MOVA installation and kept in the controller cabinet as a record of the MOVA installation details for that site.

MOVA INSTALLATION SHEET 1a

Site Name and Location:	
MOVA Licence Number:	
Installation By:	
Date:	

MOVA Detector Inputs

Det. No.	Use / Name	Controller / Det. Terminal	Det. No.	Use / Name	Controller / Det. Terminal
1			17		
2			18		
3			19		
4			20		
5			21		
6			22		
7			23		
8			24		
9			25		
10			26		
11			27		
12			28		
13			29		
14			30		
15			31		
16			32		

MOVA INSTALLATION SHEET 1b

MOVA Detector Inputs (contd. If requied)

Det. No.	Use / Name	Controller / Det. Terminal
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		

Det. No.	Use / Name	Controller / Det. Terminal
49		
50		
51		
52		
53		
54		
55		
56		
57		
58		
59		
60		
61		
62		
63		
64		

MOVA INSTALLATION SHEET 2

MOVA Force and Confirm Bits

Det. No.	Use / Name	Cont. Terminal
TO		
F1		
F2		
F3		
F4		
F5		
F6		
F7		
F8		
F9		
F10		

Det. No.	Use / Name	Cont. Terminal
CRB		
G1		
G2		
G3		
G4		
G5		
G6		
G7		
G8		
G9		
G10		

Det. No.	Use / Name	Cont. Terminal
G11		
G12		
G13		
G14		
G15		
G16		
G17		
G18		
G19		
G20		
G21		

G11 etc require a 2nd Bus/MOVA I/O Card

MOVA Site Data

Plan	File Name	Fixed Site Data Checksum	All Site Data Checksum	Data Set Loaded
1				☐
2				☐
3				☐
4				☐

Appendix B GEMINI^2 DRAWINGS

B.1 Introduction

Section B.2 contains a list of the drawings that are included at the back of this handbook.

B.2 Drawing List

a) **667/GA/32600/000** GEMINI^2 Traffic Outstation General Assembly

b) **667/GA/32600/001** GEMINI^2 Traffic Outstation PSTN Modem Assembly

c) **667/GA/32600/002** GEMINI^2 Traffic Outstation GSM Modem Assembly

d) **667/GA/26577/000** Traffic O/S Unit Mounting Details

e) **667/GA/26585/003** BUS/MOVA I/O Expansion Cable Assembly

f) **667/GA/26585/004** BUS / MOVA RS485 Cable Assembly

g) **667/GA/26585/010** TfL/Bus I/O Expansion Cable Assembly

h) **667/GA/32600/100** GEMINI^2 OMU/CPU Upgrade kit

i) **667/DB/30220/010** GPRS Car Park Outstation Power Connections

j) **667/DB/30220/002** GPRS Car Park Outstation Backplate Connections

k) **667/DB/30220/004** Car Park Outstation U/D Logic Connections

Appendix C GNU Open Software License

The text below is the licence for the GNU open software that is embedded in the Outstation firmware. This firmware contains modified GPL code and that source code is available on application to Siemens Traffic Controls Ltd as per clause 3a or 3b.

GNU GENERAL PUBLIC LICENSE

Version 2, June 1991

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change free software--to make sure the software is free for all its users. This General Public License applies to most of the Free Software Foundation's software and to any other program whose authors commit to using it. (Some other Free Software Foundation software is covered by the GNU Library General Public License instead.) You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the software, or if you modify it.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must give the recipients all the rights that you have. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

We protect your rights with two steps: (1) copyright the software, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the software.

Also, for each author's protection and ours, we want to make certain that everyone understands that there is no warranty for this free software. If the software is modified by someone else and passed on, we want its recipients to know that what they have is not the original, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that redistributors of a free program will individually obtain patent licenses, in effect making the program proprietary. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

0. This License applies to any program or other work which contains a notice placed by the copyright holder saying it may be distributed under the terms of this General Public License. The "Program", below, refers to any such program or work, and a "work based on the Program" means either the Program or any derivative work under copyright law: that is to say, a work containing the Program or a portion of it, either verbatim or with modifications and/or translated into another language. (Hereinafter, translation is included without limitation in the term "modification".) Each licensee is addressed as "you".

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running the Program is not restricted, and the output from the Program is covered only if its contents constitute a work based on the Program (independent of having been made by running the Program). Whether that is true depends on what the Program does.

1. You may copy and distribute verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and give any other recipients of the Program a copy of this License along with the Program.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Program or any portion of it, thus forming a work based on the Program, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

* a) You must cause the modified files to carry prominent notices stating that you changed the files and the date of any change.

* b) You must cause any work that you distribute or publish, that in whole or in part contains or is derived from the Program or any part thereof, to be licensed as a whole at no charge to all third parties under the terms of this License.

* c) If the modified program normally reads commands interactively when run, you must cause it, when started running for such interactive use in the most ordinary way, to print or display an announcement including an appropriate copyright notice and a notice that there is no warranty (or else, saying that you provide a warranty) and that users may redistribute the program under these conditions, and telling the user how to view a copy of this License. (Exception: if the Program itself is interactive but does not normally print such an announcement, your work based on the Program is not required to print an announcement.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Program, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Program, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Program.

In addition, mere aggregation of another work not based on the Program with the Program (or with a work based on the Program) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may copy and distribute the Program (or a work based on it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you also do one of the following:

* a) Accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

* b) Accompany it with a written offer, valid for at least three years, to give any third party, for a charge no more than your cost of physically performing source distribution, a complete machine-readable copy of the corresponding source code, to be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

* c) Accompany it with the information you received as to the offer to distribute corresponding source code. (This alternative is allowed only for noncommercial distribution and only if you received the program in object code or executable form with such an offer, in accord with Subsection b above.)

The source code for a work means the preferred form of the work for making modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

If distribution of executable or object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place counts as distribution of the source code, even though third parties are not compelled to copy the source along with the object code.

4. You may not copy, modify, sublicense, or distribute the Program except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense or distribute the Program is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

5. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Program or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Program (or any work based on the Program), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Program or works based on it.

6. Each time you redistribute the Program (or any work based on the Program), the recipient automatically receives a license from the original licensor to copy, distribute or modify the Program subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties to this License.

7. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Program at all. For example, if a patent license would not permit royalty-free redistribution of the Program by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Program.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system, which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

8. If the distribution and/or use of the Program is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Program under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

9. The Free Software Foundation may publish revised and/or new versions of the General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of this License, you may choose any version ever published by the Free Software Foundation.

10. If you wish to incorporate parts of the Program into other free programs whose distribution conditions are different, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

NO WARRANTY

11. BECAUSE THE PROGRAM IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM

PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

12. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

As a special exception, if other files instantiate templates or use macros or inline functions from this file, or you compile this file and link it with other works to produce a work based on this file, this file does not by itself cause the resulting work to be covered by the GNU General Public License. However the source code for this file must still be made available in accordance with section (3) of the GNU General Public License.

This exception does not invalidate any other reasons why a work based on this file might be covered by the GNU General Public License.

END OF TERMS AND CONDITIONS

Appendix D MOVA 4 and 5

Setup of MOVA 4 and 5 is largely identical to that for MOVA 6. Some differences are describde here.

D.1Complete Initialisation

8)	9.6.2	Initialise MOVA by entering the handset command INI=2. If the OMCU application is not required, enter INI=3 to completely re-initialise the whole unit. Enter LDV=7 to request the MOVA facility. Refer to section 9.8 if running dual stream MOVA Refer to Appendix D for MOVA 4

Initialisation is requested using the INI handset command:

Firmware	Command	OMCU Initialised	MOVA Initialised	Complete Initialisation
PB683	INI=1	✓	✓	-
PB683	INI=2	-	-	-
PB683	INI=3	✓	✓	✓
PB684	INI=1	✓	-	-
PB684	INI=2	-	✓	-
PB684	INI=3	✓	✓	✓
PB686	INI=1	✓	-	-
PB686	INI=2	-	✓	-
PB686	INI=3	✓	✓	✓

On PB683 firmware, initialising the OMCU application using INI=1 does not clear any MOVA data. Similarly, initialising the MOVA application using INI=2 does not clear any OMCU data. However, the complete unit is rebooted after any INI command is entered.

Complete initialisation effectively forces the ‘first time power-up condition’ by clearing the entire RAM within the unit. It is recommended that ‘INI=3’ is entered when a new unit is first installed to ensure that all data has been initialised. In addition to clearing the working data of the OMCU and the MOVA applications like INI=1 and INI=2 respectively, INI=3 also clears additional items which are not cleared by INI=1 and INI=2. This includes the handset command MIO (section 9.6.4), the MOVA licence number (section 9.6.5), the real time clock (section 9.6.6), and the MOVA site data stores (section 9.6.7).

The LDV=7 command is required in order to enable the MOVA software

For MOVA 4 using PB683, the following sequence should be followed to ensure it is correctly initialised.

Ensure that the MOVA unit is running issue 7 (or later) firmware:
a) Enter INI=1 to clear the units working data.
This will also clear the MOVA Enable Flag.

b) Wait for LEDs to start flashing
c) Check the 'MIO' setting. If 0, set to 1 or 2 appropriately.
d) Enter the MOVA Commissioning Screen on the connected PC and set the MOVA Enable Flag. (Section 9.6.8 - Commissioning Screen (LOOK))
e) Use the MOVA Commissioning Screen to confirm that the unit follows the normal warm -up sequence and sets itself back in control.

When loading a New Data Set -
After loading a MOVA dataset, the unit will ask "Do you want to clear the MOVA working data?". Answer 'N'.

To Clear the MOVA Working Data enter INI=1. This clears all the MOVA and OMU working data.
The above steps must be taken to reliably clear MOVA 4 Working Data

NOTE 1– Do NOT answer 'Y' to the question '"Do you want to clear the MOVA working data?"

NOTE 2 – Do not enter INI=2 on a MOVA unit running PB683.

NOTE 3 – The command INI=1 does not clear the MOVA site data and hence the MOVA site data does not need to be reloaded.

NOTE 4 – The INI=1 command will initialise the OMU side of a combined OMU/MOVA unit and therefore the OMU configuration data will need to be reloaded.

D.2 Download New Site Data (RS, LD, CN and DS)

13)	9.6.7	Download the site data into the MOVA unit from the PC and then clear the MOVA working data as instructed on the screen.

Caution: If the new site data contains a different number of links, lanes or stages, or different time-of-day data then MOVA must be re-initialised. Only if the configuration is the same as the configuration currently running in the MOVA unit (except for minor changes to timing values), can the new site data be downloaded without initialising the unit.

The site data for MOVA 4 is not compatible with the site data for MOVA 5. The latest TRL version of MOVA Setup will convert between the two formats.

MOVA 4 Site Data Loading

New site data can be downloaded into the MOVA unit using the 'Read in Site data' option – 'RS' from the MOVA main menu.

This option is password protected to prevent unauthorised changes to the site data and can only be attempted locally. The password is case sensitive and is defaulted to 'AVOMGO'.

Up to three 'plans' can be loaded into the MOVA 4 unit's memory. Normally, only plan 1 will be used. However, it is possible to configure the MOVA unit to switch between the plans at different times of day. Hence up to three plans, numbered 1 to 3, may have to be downloaded, depending on which MOVA type is installed.

No time of day changes – If only one plan is to be downloaded, then the site data file name is usually suffixed by the '.PT' extension. Enter the name of site data file without the extension and when asked, select plan number '1'. When loading is complete, the MOVA unit will recognise that this plan data contains no time of day changes and will not require any more plans to be downloaded.

Three plans – When the site data contains time of day changes, each plan has to be downloaded into the MOVA unit one after the other. Enter the name of site data file without the extension and the three or four plans should be listed on the screen, e.g. for MOVA 4:

```
Enter the name of the file without any extension
  (or QUIT to abort) ... E12345

     1.  E12345.P1
     2.  E12345.P2
     3.  E12345.P3
  key number of the file you wish to transmit . . .
```

Start with plan 1, and download the site data with the extension '.P1'. When that data has been loaded, the MOVA unit will insist that two more plans be downloaded so that all three plans in its memory have the same number of stages, links and lanes, etc.

When the download of a plan is complete, the MOVA 4 unit will display the following:

```
finished

Reading site data in to plan 1 complete.

Do you want to clear the MOVA working data?

1) If you are about to read in another plan then answer “N”.
2) If you have just read in new site data that only makes minor changes and
   would like to keep the old working data (e.g. the vehicle flows and the
   assessment log) then answer “N”.
   Note that the new data must contain the same number of stages, links and
   lanes and the same time-of-day information as the previous site data.
3) If you have just read in the last of three plans or the one and only plan
   for this site, and the unit has just been initialised or this new site
   data makes major changes, then answer “Y” so the unit can perform a
   clean start with the new site data.

Do you want to clear the MOVA working data <Y or N> ? Y

The MOVA unit will now reboot in order to clear all of its working data, load
the new site data and begin monitoring the intersection.
Note: MOVA will be initially disabled. Use the “Look” screen to put MOVA back
      on-control after a warm-up cycle.

Press [Return] to reconnect to the unit after it reboots...
```

Always answer N to the question

`Do you want to clear the MOVA working data <Y or N>`

then use the INI=1 command to clear the working data if required. It is then necessary to re-enter the LDV=7 command . N.B. The value of LDV may be displayed as 7, i.e. LDV:7, but it is still necessary to enter LDV=7 as this command also sets other internal data.

Checking the Site Data

When new site data has been loaded, check it by displaying the site data using the ‘LD’, ‘CN’ and ‘DS’ options.

If more than one plan has been downloaded, the ‘LD’ option allows one of the three plans to be loaded into the working area. The ‘CN’ option shows the names of the plans loaded into each of the three backup stores and the name of the plan that currently resides in the working area. If there are no time of day changes, i.e. only one plan has been loaded then the MOVA unit will automatically load that plan into its working area.

The ‘DS’ option displays all the site data of the plan currently residing in the working area. The MOVA unit pauses after each section, so that the data does not scroll off the top of the screen.

D.3 Commissioning Screen (LOOK)

14)	9.6.8	Use the commissioning screen to check for following. a) MOVA is currently not enabled (MOVA enabled = 0) b) The Controller is ready* (CRB = 1) c) The Confirm bits are all set to ‘1’, except for the current stage which should be set to ‘0’. Watch the controller perform at least one complete cycle to check that each stage and phase confirm bit is being activated correctly by the controller. * It may be necessary to press the ‘Normal’ button on the controller’s manual panel before it will activate the ‘Controller Ready Bit’.
15)	9.6.8	Also use the commissioning screen to check the operation of each detector is correct. The detector display normally shows ‘0’, turning to a ‘1’ when a vehicle passes over the loop (or the controller has latched a pedestrian demand). Also check that vehicles in adjacent lanes do not activate the loop.

The commissioning screen is used extensively to check the operation of the detectors, the force bits and the confirm bits. To display the commissioning screen, type ‘LOOK’ from the MOVA Main Menu.

Typical MOVA 4 Comissioning Screen

```
                         SIEMENS MOVA COMMISSIONING SCREEN
Detectors:    1  2  3  4    5  6  7  8    9 10 11 12   13 14 15 16
              0  0  1  1    1  1  1  0    0  0  0  0    0  0  0  0

             17 18 19 20   21 22 23 24   25 26 27 28   29 30 31 32
              0  0  0  0    1  0  1  0    0  1  1  1    0  0  0  0

Confirms:   CRB  1  2  3    4  5  6  7    8  9 10 11   12 13 14 15
              1  0  1  1    1  1  1  0    0  0  0  0    0  0  0  0

Force Bits:        HI/TO    1  2  3  4    5  6  7  8
                     1      1  0  0  0    0

 MOVA enabled. . 1  Warmup. . . . . 6  Multi stage . . 0  On control. . . 1
         Demanded stage . . . 1  Watchdog . . . 9  Error count . . . 0

                        MOVA COMMISSIONING SCREEN OPTIONS
Press:   M  to enabled or disable MOVA;     C  to set MOVA on or off control;
         R  to refresh the whole screen;    X  to exit Commissioning Screen;
         Z  to zero the error count;
         1,2,3,... to force a stage (or 0 to cancel current force);

Press a Key:
       --- Press a key listed above  or  Press <Space> for Main Menu ---
```

Typical MOVA 5 Comissioning Screen

```
                         SIEMENS MOVA COMMISSIONING SCREEN
Detectors:      1--4  5--8    9-12 13-16   17-20 21-24   25-28 29-32
                0000  1001    1001  1000    0000  0000    0000  0000

               33-36 37-40   41-44 45-48   49-52 53-56   57-60 61-64
                0000  0000    0000  0000    0000  0000    0000  0000

Confirms:  CRB  1--4  5--8    9-12 13-16   17-20 21-24   25-28 29-31
            1   0111  1111    0000  0000    0000  0000    0000  0000

Force Bits:         HI/TO     1  2  3  4    5  6  7  8    9 10
                      1       1  0  0  0    0

 MOVA enabled. . 1  Warmup. . . . . 6  Multi stage . . 0  On control. . . 1
         Demanded stage . . . 1  Watchdog . . . 9  Error count . . . 0

                        MOVA COMMISSIONING SCREEN OPTIONS
Press:   M  to enabled or disable MOVA;     C  to set MOVA on or off control;
         R  to refresh the whole screen;    X  to exit Commissioning Screen;
         Z  to zero the error count;
         1,2,3,... to force a stage (or 0 to cancel current force);

Press a Key:
       --- Press a key listed above  or  Press <Space> for Main Menu ---
```

The top of the screen shows the live state of all the detector inputs, followed by the **Controller Ready Bit (CRB)** and confirm bit inputs from the controller, and the force bits that the MOVA unit is currently outputting. The **'MOVA enabled'** and **'On Control'** flags and the **'Warm-up'** and **'Error counts'** are described in more detail in section 9.6.10.

For inputs on the Bus MOVA (Digital) I/O card, 0 = input open circuit, 1 = input short circuit.

For semi-integral MOVA, the input sense can be inverted or not, dependant on the controller configuration.

The **'Multistage'** flag is set to '1' if the confirm inputs indicate more than one stage is active, e.g. when the controller has failed or the I/O cables have been disconnected from the back of the MOVA unit.

The **'Demanded stage'** entry shows the stage that MOVA is currently demanding, or would try to demand if it was on control.

The **'Watchdog'** count should normally increment every half a second and remain in the range 0 to 20. It is used internally by the MOVA software to ensure that the various MOVA sub-systems are functioning correctly.

While the commissioning screen is active (and the description of these keys is being displayed), the state of the **'MOVA enabled'** flag and the **'On Control'** flag can be toggled by simply pressing 'M' or 'C' respectively. Similarly, the **'Error Count'** can be cleared back to zero by simply pressing 'Z'.

16)	9.6.8	**Important:** The following causes the MOVA unit to take control of the Intersection and care should be taken to avoid undue disruption to traffic flows. Still using the commissioning screen, force each stage in turn and check that the controller moves to the required stage and that the correct stage / phase confirm bits are activated.

(Remember to press <SPACE> to display the 'Screen Keys' before attempting to use any of the 'single key' commissioning screen commands)

To test the force bits and the confirms from the controller, the MOVA unit should first be switched off-line, i.e. if the **'MOVA Enabled'** flag is set to '1', press 'M'.

To force a stage simply press the number of the required stage, e.g. press '1' for stage 1 and then press '2' when stage 2 is required.

The MOVA unit will keep forcing the selected stage for about one minute after the key is pressed. To end the test, press '0'.

Pressing 'X' will exit the commissioning screen and the MOVA Main Menu will be displayed.

Pressing the space bar toggles between the single key press commands and the MOVA Main Menu:

Typical MOVA 4 Main Menu Screen

```
                            SIEMENS MOVA COMMISSIONING SCREEN
Detectors:     1  2  3  4    5  6  7  8    9 10 11 12   13 14 15 16
               0  0  1  1    1  1  1  0    0  0  0  0    0  0  0  0

              17 18 19 20   21 22 23 24   25 26 27 28   29 30 31 32
               0  0  0  0    1  0  1  0    0  1  1  1    0  0  0  0

Confirms:   CRB  1  2  3    4  5  6  7    8  9 10 11   12 13 14 15
               1  0  1  1    1  1  1  0    0  0  0  0    0  0  0  0

Force Bits:        HI/TO    1  2  3  4    5  6  7  8
                     1      1  0  0  0    0

 MOVA enabled. . 1  Warmup. . . . . 6  Multi stage . . 0  On control. . . 1
         Demanded stage . . . 1  Watchdog . . . 9  Error count . . . 0

                                SIEMENS MOVA MAIN MENU
RS – Read in Site data   VM – View MOVA Messages       DF – Display Flows
CN – Check fileNames     DE – Display Error log        CF – Clear Flows
DS – Display Site data   CE – Clear Error log          LF – Look at/set Flags
LD – Load Data set       DA – Display Assessment log   CT – Check/set Time
                         CA – Clear Assessment log     FI – Finish
  Enter Option:
    --- Enter Option from the Menu  or  Press <Space> for Screen Keys ---
```

Typical MOVA 5 Main Menu Screen

```
                         SIEMENS MOVA COMMISSIONING SCREEN
Detectors:      1--4  5--8    9-12 13-16   17-20 21-24   25-28 29-32
                0000  1001    1001  1000    0000  0000    0000  0000

               33-36 37-40   41-44 45-48   49-52 53-56   57-60 61-64
                0000  0000    0000  0000    0000  0000    0000  0000

Confirms:  CRB  1--4  5--8    9-12 13-16   17-20 21-24   25-28 29-31
            1   0111  1111    0000  0000    0000  0000    0000  0000

Force Bits:         HI/TO     1  2  3  4    5  6  7  8    9 10
                      1       1  0  0  0    0

 MOVA enabled. . 1  Warmup. . . . . 6  Multi stage . . 0  On control. . . 1
         Demanded stage . . . 1  Watchdog . . . 9  Error count . . . 0

                             SIEMENS MOVA MAIN MENU
DS - DataSet menu        VM - View MOVA Messages       DF - Display Flows
     for operations:     DE - Display Error log        CF - Clear Flows
     Display, Load       CE - Clear Error log          LF - Look at/set Flags
     Download, Upload    DA - Display Assessment log   CT - Check/set Time
                         CA - Clear Assessment log     FI - FInish

Press a Key:
       --- Press a key listed above  or  Press <Space> for Main Menu ---
```

While the MOVA Main Menu is being displayed, enter the two-letter menu option required and press ‘Return’. When the required option completes, the main screen will automatically re-appear.

INDEX

— A —

— B —

— C —

— E —

— F —

— G —

— I —

— J —

— K —

— L —

— M —

— O —

— P —

— R —

— S —

— T —

— U —

LAST PAGE OF THE

GEMINI^2 TRAFFIC OUTSTATION HANDBOOK