Handset Handbook

667/HH/46000/000

for

Siemens Type 950

Family of Traffic Controllers

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SAFETY WARNING

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/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 or the relevant local, state and government regulations.

(ii) Such personnel must take heed of all relevant notes, cautions and warnings in this Handbook and any other Document or 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 any protective covers or working on any part from which the protective covers have been removed.
(c) In the event of any person working elsewhere on the junction the Mains Supply to the controller must be switched off and the master switch locked in the ‘off’ position.

WARNING

Removing the Electricity Board Fuse or Switching off the Controller switch or the Manual Panel Signals On/Off switch does not guarantee isolation of the equipment.

WARNING

These controllers require specific configuration to enable them to function correctly when installed.

The configuration process is a complex activity. It should only be carried out by persons who are adequately trained, have a full understanding of the needs of the county or region where the controller is to be used, and are experienced in the tasks to be undertaken.

WARNING

There are numerous RJ45 connectors on the controller. Care should be taken when connecting cables because most of these are not Ethernet ports and must NOT be connected to network equipment or computers.

Safety Warning - Battery

The Controller may be fitted with a coin-cell.

Do not short circuit, recharge, puncture, take apart, incinerate, crush, immerse, force discharge or expose to temperatures above the declared operating temperature range of the product, otherwise there is a risk of fire or explosion..

Batteries should be handled and stored carefully to avoid short circuits. Do not store in disorderly fashion, or allow metal objects to be mixed with stored batteries. Keep batteries between -30°C and 35°C for prolonged storage.

The batteries are sealed units which are not hazardous when used according to these recommendations. Do not breathe vapours or touch any internal material with bare hands.

Battery disposal method should be in accordance with local, state and government regulations. In many countries, batteries should not be disposed of into ordinary household waste. They must be recycled properly to protect the environment and to cut down on the waste of precious resources.

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1 INTRODUCTION

1.1 Overview

Access to the traffic controllers' timings and status information is gained using the web interface or by entering handset command mnemonics. This handbook covers the controller handset command mnemonics and using the handset terminal. The ST950 User Guide contains information on the web interface.

This handbook assumes that the user is familiar with the information provided in the General Handbook for the controller. These handbooks are listed in section 1.3.

This document lists all the handset command mnemonics for the firmware used on the ST950 family of traffic controllers.

The document has been sub-divided in to several sections, each covering a different part of the handset system and how the handset is used to access information within the controller. A summary of each section is given on page 10.

In a printed copy of this handbook for Installation and Maintenance Engineers, the optional appendix (section 13) may be omitted. It contains details on the handset commands typically only required by Configuration Engineers, i.e. print up to, but not including page 182.

1.2 Contact Us

If you have any comments on this handbook, or need any further information, you can contact us at trafficwebmaster.stc@siemens.com.

1.3 Related Documents

The following documents are referred to in the text of this handbook and may be useful for reference.

667/HB/46000/000	ST950 General Handbook
667/HB/46000/001	ST950 Facilities Handbook
667/HU/46000/000	ST950 User Guide [web interface and WIZ command]
667/HE/45950/000	Installation, Commissioning and Maintenance handbook for the ST950 ELV Controller
667/HE/46950/000	Installation, Commissioning and Maintenance Handbook for the ST950 LV Controller
667/HB/32921/007	Handbook Supplement for monitoring Helios CLS (NLM) Signals [using an "LED Lamp Switch" Card]

1.4 Document Revision History

Issue	Summary of the Changes
1	First version for the ST950 controller.
2	Updates for ST950 firmware 46059 issue 5: • Number of conditioning timers (CDT) increased from 96 to 480. • Added new command CFF: Conditioning Facility Flags. • Added new ELV Load Types (KLT): 8, 9, and 11.
3	ENG codes 325 – 328 and 331 added for LRT. Clarified impact of SDE/SA on STS, SCI and SCP commands. Updates for ST950 firmware 46059 issue 6: • Added new commands PLF and PLS : Smooth CLF fast and slow factors. • Added new ENG codes. • Added new LV Load Types 12 – 18 to KLT command. • Added new command KSN: Lamp monitoring surge delay. • Added new command KRW : Lamp monitoring red and wait. • Added several new commands for Last Lamp Monitoring (sections 9.10 and 9.11) • Wording for FLF 4:8 improved to explain more about HFF. Updates for ST950 firmware 46059 issue 7: • Commands TMA, TMC, TMT reinstated: Single-step test mode. Various other minor corrections and improvements.
4	Updates for ST950 firmware 46059 issue 9: • LMP; press SPACE for next colour/phase. • STS shows 'IGD' if Intergreen Delays are active. • MVU now also influences the reporting of LRT mode (as well as MOVA mode). • MCM and PHT added. • LMU Sensor/Aspect web page is now called LMU Readings. • FZH, KPC, MOX, PHT, ZIO and ZPT added (for internal use only). Various other minor corrections and improvements, including: • MVC correction; values shown were always in seconds, not 10s units. • Description of FLF 33:4 was missing. • FZQ displays more information (from firmware issue 6 onwards)
5	Updates for ST950 firmware 46059 issue 10 and 11: • PME – Description of '`*I`' error added • ZLP and ZST added (for internal use only).
6	Updates for ST950 Plus+ Controller: • TSE – Fault triggers • KSP – Sensors for Phase (and Colour) • RST – Restart Supervisor • DLP – Dimming Level Percentage
7	Updates for ST950 firmware 46059 issue 22 • Adding more Plus+ fault details (FLF2, FLF6, FLF9, FLF43) • Additions for the new DVI35 facility, inc adding XCT, XDX, XRC. • Additions for Special Conditioning integer support, inc adding INT. • Corrections to the description of the RST command.
8	Updates for ST950 firmware 46059 issue 24 • IOC/SPA/SPB - I/O Counts are now reset every 15 minutes (not 10)

1.5 Electronic Document

The electronic version of this handbook can be found on the Siemens website www.siemens.co.uk/traffic in the Handbooks section under Downloads.

1.6 Abbreviations

AC ..... Alternating Current
CLF ..... Cableless Linking Facility
DC ..... Direct Current
DFM ..... Detector Fault Monitor
ELV ..... Extra Low Voltage
FT ..... Fixed Time
GPS..... Global Positioning System
HPU..... High Power Unit (for ELV Controllers)
I/G ..... Intergreen
I/O ..... Input/Output
IC4..... Intersection Configurator version 4
IMU..... Integral Monitoring Unit
LED ..... Light Emitting Diode
LMU..... Lamp Monitor Unit
LRT ..... Light Rail Transit
LSLS ..... Low Voltage / Serial Lamp Switch
LV..... Low Voltage (Mains)
mA..... milliamps
MOVA..... Microprocessor Optimised Vehicle Actuation
mS..... milliseconds
MTCS ..... Master Time Clock System
OMU..... Outstation Monitor Unit
OTU..... Outstation Transmission Unit
PCB..... Printed Circuit Board
RAM ..... Random Access Memory
RLM..... Red Lamp Monitoring
RMS ..... Remote Monitoring System
rms ..... Root Mean Square
ROW ..... Right Of Way
RTC..... Real Time Clock
SA ..... Speed Assessment
SDE..... Speed Discrimination Equipment
SDE/SA Speed Discrimination Equipment / Speed Assessment
ST750..... 'Siemens Type 750' Family of Traffic Controllers
ST800..... 'Siemens Type 800' Family of Traffic Controllers
ST900..... 'Siemens Type 900' Family of Traffic Controllers
ST950..... 'Siemens Type 950' Family of Traffic Controllers
UTC..... Urban Traffic Control
VA ..... Vehicle Actuated
ZXO..... Zero Cross Over

1.7 Document Structure

The document has been sub-divided in to several sections, each covering part of the handset system and how the handset is used to access information within the controller...

Section 2 describes some of the main differences between the handset commands on this controller family and the ST900 and ST750 controllers.

Section 3 deals with how to connect the **Handset** to the controller and how to enter commands.

Section 4 describes the **Controller Faults**, the meaning of each fault flag and how to clear the faults.

Section 5 describes the other commands used to **Maintain and Monitor** the operation of the controller, i.e. the facilities and equipment configured, issue states, lamp supply, test facilities and status information such as current mode and stage.

Section 6 is concerned with the **Input and Output** and the associated commands and facilities, including DFM, SDE/SA, Call/Cancel and U/D.

Section 7 describes how to set the **Time** and the other commands associated with the master time clock, including the **Timetable** and the **Cableless Link Facility (CLF)**.

Section 8 details the handset commands used by each of the **modes of operation** of the controller, i.e. VA, fixed time, etc., as well as other facilities which affect the timings of the controller such as phase delays.

Section 9 covers commissioning and maintaining the **Lamp Monitor**, including the red lamp monitor and how to simulate lamp loads for test purposes.

Section 10 lists commands that are no longer required or have been replaced.

Section 11 contains a complete **Summary** of all the handset commands accepted by the traffic controller, including the name of the web page where the same data can be accessed.

Section 12 is the **Index** which can also be used as a quick reference guide since each mnemonic listed in alphabetic order includes a short description, and each command appears a second time under its associated facility. For example, the commands associated with the call/cancel facility are listed under ‘C’ for ‘Call / Cancel’ as well as the commands themselves being listed under ‘D’ for ‘DCL’ and ‘DCN’.

Section 13 is an **Optional Appendix** containing details on the **Engineering Commands** used mainly by Configuration Engineers.

2 CHANGES FROM THE ST900/ST750 CONTROLLERS

For those people familiar with the ST900 and ST750 Traffic Controllers (PB801 firmware), the following points in particular should be noted when using handset commands on the ST950.

- Most status information and settings available via handset commands are now also available via a web interface, complete with on-line help. For more information refer to section 11 and the controller's User Guide.
- Other software applications may report faults and these have not been assigned unique controller FLF numbers. All the active faults are listed on the Fault Table and this can be viewed using the WIZ command or web interface. If faults other than FLF faults are active, the fault `FLF 62:255 !FLF` is set to remind the user to check the Fault Table.
- The controller's 'historic rolling log' is now part of the System Log; the LOG command mnemonic has been removed.
- The ST950 does not support the Integral OTU, the IMU or the SDE/SA card.
- The configuration initialisation commands are no longer used.
- The daylight saving and GPS Clock features are set up using the web pages and those settings affect the clock used by all the software applications in the ST950. The controller handset commands for the GPS clock, daylight saving and week numbers have all been removed.
- If Controller Time is configured to follow network or GPS time (i.e. 'System Time') the time cannot be set using TOD.
- If a mains synchronised clock is required, the handset commands remain the same.
- I/O cards fitted to the ST950 may be used by applications other than the Controller Application. The IOB command and FLF13 fault only relate to those cards configured by IC4 and used by the Controller Application.
- Section 10 starting on page 143 lists the ST900 handset commands that are no longer applicable to the ST950.

3 USING THE HANDSET

3.1 Connecting to the RS232 Handset Port

The handset should be plugged into the 25 way D-Type connector on the front of the CPU Card. See section 3.2 for specifics on the connection.

If the handset port is already occupied by a serial cable to another unit installed in the cabinet, **do not** unplug that cable, but plug the handset into that unit and it should provide a transparent handset link through to the controller. For example, connecting a handset to the Siemens Gemini unit and typing the command “XXC” will connect through to the traffic controller.

The controller normally communicates at 1200 baud using 7 data bits with one even parity bit and one stop bit. However it can also operate at 9600 or 19200 baud, or with 8 data bits, no parity bit and one stop bit;.

So that the controller can determine the baud rate and word size of the handset being used, the ‘return’, ‘enter’ or ‘CR/LF’ key should be pressed a number of times until ‘SIEMENS’ is displayed.

IMPORTANT

Since the controller waits until it is sure of the baud rate used by the handset, i.e. until ‘return’ has been keyed a number of times, the controller does not generate a prompt automatically on connection of a handset. This can ‘confuse’ older single-line display handsets for example; see section 3.12.2.

Also note that it is possible to inform the controller of the size of the handset being used, i.e. the number of characters that it can display on one line. This is described on page 21.

3.2 Handset RS232 Interface

Type

RS232C CCITT V24 and V28

Method of Connection

Controller - Cannon DP 25-way female socket connector
Terminal Device - Cannon DP 25-way male plug connector

Pin Allocation

Pin 1	-	-	Protective ground
Pin 2	→	TD	Transmit data..... (from terminal to controller)
Pin 3	←	RD	Received data..... (from controller to terminal)
Pin 4	→	RTS	Request to send..... (used for hardware flow control)
Pin 5	←	CTS	Clear to send ..... (used for hardware flow control)
Pin 6	←	DSR	Data set ready ..... (set active by the controller)
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	→	DTR	Data terminal ready..... (used to detect the presence of a handset)

Pins 9 and 10 are connected to the controller's 5-Volt logic supply (protected by a 500mA fuse) and can supply a maximum of 300mA (total).

Baud Rate

1200, 9600 or 19200 Baud – Auto-detected*

Bit Format

The Bit format may be either of the following – Auto-detected*

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

START BIT	1	2	3	4	5	6	7	8	PARITY	STOP BIT
(SINGLE BIT)	(LSB	•	•	•	•	•	•	MSB)	(NONE)	(SINGLE BIT)

Mode

Full duplex, Hardware Handshaking (using RTS and CTS)

Character Set

ISO Alphabet No. 5 (ASCII)

3.3 Handset Virtual Terminal Connections

In addition to the RS232 Handset Port, the handset command interface is also available over the various network connections using a virtual terminal (*telnet* in 3

* *Auto-Detection of the Baud Rate and Bit Format is provided for normal handset mnemonic-based communications only. The unsolicited messages generated by the controller Self-Test are always transmitted using 1200 Baud, 7 Data Bits with Even Parity.*

and earlier, *ssh* in later). Refer to the controller User Interface Handbook 667/HU/46000/000 for information on the network connections.

3.4 Access Levels

3.4.1 Introduction

There are defined levels of access to the controller:

Level 1..... Manual Control via the Manual Panel. (Police and Traffic Wardens)

Level 2..... Modify level 2 data items using a handset which may be sited remotely, e.g. at an Instation, and communicates with the controller via a RMS or UTC system. (Local Authority Traffic Engineer or Service Engineer, on-site or remote)

Level 3..... To change certain safety timings using a handset on-site and to load a new IC4 Configuration. (Local Authority Traffic Engineer or Service Engineer on-site)

This handbook describes how to use the handset to view and modify data within the traffic controller and therefore is not concerned with other access levels. A single letter or number identifies the access level required by each handset command:

Code	Access Level	Description
R	Read only	The data cannot be changed
O	Open access	The data can always be changed
2	Level 2	The PME security code needs to be entered first
3	Level 3	The button on the CPU card also needs to be pressed

3.4.2 Access Level 2

To enable Level-2 access, enter the appropriate PME security code as described in information supplied separately to each user.

Level-2 access will remain enabled for approximately 20 minutes. Entering the PME security code again or changing any Level-2 or Level-3 data will give another 20 minutes of Level-2 or Level-3 access, so while the user is actively modifying data (e.g. timings) the access level will not expire until no changes have been made for 20 minutes. In addition to the time-out period, Level-2 access will expire when the handset is unplugged, the handset virtual terminal session is closed, PME=0 is entered or the controller is restarted.

The security code command will display `PME:0 (IN USE)` if another handset session (local or remote) has obtained Level-2 access – the controller will only grant one handset session Level-2 access.

If the option ‘Prevent Unauthenticated Handset Changes’ is enabled on the ‘System – Settings – Security’ web page it is not be possible to obtain write access and make

changes using the 25-Way RS232 Handset Port. The security code is rejected with the *I error.

3.4.3 Access Level 3

To enable Level-3 access, enter the PME security code and then within 10 seconds press and release the Level-3 button on the CPU Card. This button is situated just above the handset connector and confirms to the controller that there is an operator on-site.

There are two alternative ways of obtaining Level-3 access, designed for when the handset is extended to the manual panel so that only the manual panel door needs to be opened.

1) Press the 'lamp test' button on the manual panel within 10 seconds of entering the PME security code,

   OR

2) Type 'LEV=3↵' within 10 seconds of entering the PME security code and within 2 minutes of opening the manual panel door.

Note that 'LEV' shows the access level '2' or '3' obtained, '0' for none.

3.5 Command Format

All operator commands commence with a three-character command code indicating the parameter to be monitored or changed. This 'mnemonic' is normally an abbreviation of the associated parameter making them easier to remember, for example, entering the mnemonic 'TOD' displays the 'Time Of Day' on the handset.

Following the three-character mnemonic may be one index or two indices. After the mnemonic and the indices (if any), the controller will display the current value of the parameter. A colon ':' is used to separate this from the mnemonic and indices.

For example, there is one minimum green time per phase, therefore the mnemonic 'MIN' uses one index to identify the phase and then displays the minimum green time for that phase.

Keystrokes	Display
MIN A↵	MIN A:5

Another example is the mnemonic 'IGN' that accesses the phase intergreens. These are specified on a 'phase to phase' basis and so this command requires two indices, one to specify the 'from' phase and the other to specify the 'to' phase. Therefore, to view the current value of the intergreen from Phase A to Phase B, the following command would be entered and then the result would be displayed:

Keystrokes	Display
IGN A B↵	IGN A B:5

To modify the value, the full command can be entered followed by an equal sign '=' and the new value required.

Keystrokes	Display
IGN A B=6↵	IGN A B:6

NOTE: Write access may need to be obtained before data can be modified (see page 14) and most commands have configurable range limits to limit the range of values that can be entered.

Once a command has been entered and the result is being displayed, the '+' and '-' keys can be used to display the information for the next or previous index. In the previous examples, the intergreen from Phase A to Phase B was explicitly requested, however the indices may be omitted and the '+' key used to scroll through the information starting with the first value:

Keystrokes	Display
IGN↵	IGN A A:NC
+	IGN A B:5
+	IGN A C:7
-	IGN A B:5

Once the required parameter is displayed, the value can be modified by simply entering '=' and the new value, without needing to re-enter the mnemonic and the indices:

Keystrokes	Display
IGN↵	IGN A A:NC
+	IGN A B:5
=	IGN A B=
6	IGN A B=6
↵	IGN A B:6

3.6 Handset Error Codes

If the command entered contains an error, the command is re-displayed up to the point at which the error was detected and one of the following error code letters is displayed.

For example, on a six phase controller (Phases A to F), entering the following command results in the error message shown. In this case, the index '`G`' is outside of the permitted range of values (Error Code '`*R`').

Keystrokes	Display
`IGN G A↵`	`IGN G*R`

Error Code	Name	Description
`*A`	Access Level	Access level for this command has not been enabled. See section 3.4.
`*B`	System Busy	The controller is still busy storing the data from the previous command.
`*C`	Not Configured	The facility to which the command relates is not available on this controller.
`*F`	Fixed Index	The + and - keys are not applicable to current command.
`*I`	Inaccessible	The facility to which the command relates is not accessible or this controller is not configured to provide the facility.
`*L`	Lights On	The command will not be accepted until the signals are switched off using the signals' on/off switch on the manual panel.
`*M`	Mnemonic Not Recognised	The three-character command mnemonic is not recognised.
`*N`	Non-conflicting Phases	Phases specified in the proceeding intergreen command (IGN) are non-conflicting and this cannot be changed to conflicting and with the intergreen time specified using the handset.
`*P`	Premature End	The command line contains insufficient data, e.g. an additional index or value input required.
`*R`	Range Error	The preceding value is out of range; i.e. is outside of the limits defined for that command.
`*S`	Syntax Error	Invalid character detected at the point immediately preceding the asterisk.
`*V`	Invalid Index	An '=', '+' or '-' operation has been attempted but no valid handset command is currently being displayed.
`*W`	Write Protected	The information is read only.
`*X`	Wrong Stream Type	An attempt has been made to change data on a stand-alone pedestrian stream with a command that is only applicable to intersection streams, or vice versa. Also see the description of the '!' character overleaf…

The controller will display an exclamation mark '!' after an index if the command is not applicable to the type of stream to which the index applies, for example:

'`IGN A! C:0`' where the command is only applicable to intersection phases but phase A is a phase in a stand-alone stream, or

'`PAR 1!:0`' where the command is only applicable to stand-alone streams but stream 1 is an intersection stream.

3.7 Handset Command Memories

It is possible to store up to 10 handset commands in the controller's memory, so that they can be recalled with just a couple of key presses.

To store a command, firstly enter the command in the normal way, pressing '↵' as normal so the result is displayed. Then enter two dots and any number '0' to '9' to specify one of the ten memories to store the command in.

The handset may then be used to enter any other commands, and even unplugged and replaced.

For example, to store the fault scanning commands in to commands memories '1' and '2', enter the following keystrokes:

Key Strokes		Display
FFS↵	(first command)	FFS END OF LOG
..	(two dots to store)	..
1	(in memory #1)	FFS END OF LOG
FDS↵	(second command)	FDS END OF LOG
..	(two dots to store)	..
2	(in memory #2)	FDS END OF LOG

To recall a stored command, just enter one dot this time and followed by the same number '0' to '9' as used to store the command.

So, to use the above commands to scan for faults when the controller system error LED is illuminated, enter the following keystrokes:

Key Strokes		Display
.1	(recall memory #1)	FFS 18:255 PDFM
+	(next fault, if any)	FFS END OF LOG
.2	(recall memory #2)	FDS 32:00000001
+	(next fault, if any)	FDS END OF LOG

In this example, the controller fault flag 18 is set indicating a fault has been reported by the priority detector fault monitoring facility, and the fault data indicates the priority unit that has failed. The fault is described in detail on page 45.

To clear a command memory, press '↵' so that only the prompt is displayed, then enter two dots and the number of the memory to be cleared.

3.8 Controller Input Simulation

While the contents of an I/O port are being displayed using the 'IOP' handset command, pressing the keys '0' to '7' will simulate the operation of the eight input lines on that port.

This facility does not require any access level to be enabled. The pulse, which lasts for 200mS, is inserted after any input inversions, i.e. pulse is always 'active', but before the handset and MTCS filter arrays. Any programming/conditioning to prevent these inputs will also prevent this input simulation.

3.9 Handset Displays

In addition to the rather 'static' displays described so far, the controller is in general constantly updating any display. For example, entering TOD displays the current time of day and this is updated as the time increments:

Keystrokes	Display
TOD↵	Thu12SEP13 15:24:35
	Thu12SEP13 15:24:36
	Thu12SEP13 15:24:37
	...

Note that although not clear from the above diagram, the new display will appear on the same line as the original, thus overwriting the old display, and not on the following line as the diagram may imply.

Also note that due to the restricted display width, the controller has dropped the mnemonic from the display. If the above example were repeated on a wider screen handset terminal, the following would be displayed. See section 3.10 for more information about display widths.

```
TOD:Thu 12-SEP-13 15:24:35
```

Functions whose data values change more often than once a second may not be accurately reflected on the handset display. For example, if IOP is used to display detector activations on an I/O port, very short activation of input may not appear on the handset display.

3.10 Handset Display Sizes

The traffic controller has been designed to work with a variety of different types of handset terminals. Compatible handsets are listed in section 3.12 starting on page 23.

It defaults to a 20-character display width to suit the more popular 20-character by 4-line handsets. This allows many commands to display more information than could be displayed on the single line 14-character handsets that used to be the norm. It also makes it less likely that the mnemonic is dropped to make room for the index and value.

A 14-character handset can still be used since most of these handsets allowed the display to be scrolled left and right in order to view longer displays. Alternatively, the display width can be explicitly limited to 14 characters by entering the open-access command 'WID=14↵'.

The command 'WID=80↵'can be used to increase the display width used by the controller to a maximum of 80 characters. Increasing the display width allows even more information to be displayed on a single line.

3.11 Full Screen Display

The handset system provides the option for a full screen status display showing the states of the lights and the I/O ports, and the displays from 10 handset commands, all updated simultaneously.

If a PC or other VT100 compatible terminal / terminal emulator are being used as a handset, it is possible to enable the controller's full screen status display. To inform the controller that the handset being used is large enough, the WID command is again used, but the value is 'WID=80x25↵'.

Once this has been enabled, pressing the '**$**' (dollar) key toggles the full screen status display ON and OFF. The status display splits the screen in two, with the top half displaying status information while the bottom half continues to function as a normal handset terminal.

While the full status display is active, pressing the '"' (double-quotes) key suspends normal handset operations and displays the 10 handset commands which have been stored in the command memories, see page 19. Pressing any key to start a new handset command switches off the handset command memories and restores normal handset operation, although the status information at the top of the screen is still updated.

Although the full screen status display can be used with any baud rate, it obviously functions much better at higher baud rates.

```
  A B C D E F G H I J K L M N O P Q R S T U V W X Y Z A2B2C2D2E2F2  AR S1 S2 NRM
R - 0 - 0 0 0 0 0 -                                               S3 S4 S5 MAN
A - - - 0 - - - - -                                               S6 S7 Aw F/T
G 0 - 0 - - - - - -                                               HC Hi PM V/A
0:00000000 5:00000000 10:00000000 5:00000000 20:00000000        CAB A1 A2 A3 CLF
1:00000000 6:00000000 11:00000000 6:00000000 21:00000000         SIGNALS OFF DIM
2:00000000 7:00000000 12:00000000 7:00000000 22:00000000 25:00000000 28:00000000
3:00000000 8:00000000 13:00000000 8:00000000 23:00000000 26:00000000 29:00000000
4:00000000 9:00000000 14:00000000 9:00000000 24:00000000 27:00000000 30:00000000
================================================================================
0) TOD:Tue 06-MAR-07 15:45:14
1) STS 0:VA-SETA S1-3 SDE
2) SPH A:MIN EXT+ MAX
3) SPH B:DEM
4) SPH C:MIN EXT  MAX
5) SPH D:DEM      SEQ
6) >
7) >
8) >
9) >
================================================================================
MAX F:30
MIN
MIN A:5
```

Note that if a VT100 compatible terminal is being used, regardless of whether the full screen status display has been enabled or not, the cursor keys are correctly interpreted by the controller. The up-arrow and down-arrow keys are particularly useful as they can be used to recall any one of the last 5 commands that have been entered. The recalled command can be re-submitted with or without modification, after it has been rejected due to a range error or an access level error for example.

3.12 Handset Types

3.12.1 Portable Handset Types

The controller will function with any terminal device capable of displaying ASCII text connected to the controller's handset port (section 3.2 on page 13).

The following portable terminal devices are available:
667/4/13296/000 Old Oyster handset [No longer recommended]
667/4/13296/001 TechTerm
667/4/13296/002 Oyster handset [Larger Screened]

In addition, any computer with a standard serial connection (as described in section 3.2, page 13) and standard terminal software can be used.

3.12.2 Oyster (Single Line Displays)

Older handsets tended to have a display that only contained one line of text. These are still supported by the controller, but with some limitations.

They cannot, for example, be used to monitor the progress of the Controller Self-Test because it generates text designed for a display containing at least four lines of 20 characters each in order to provide sufficient diagnostic information. For more details on the Controller Self-Test, refer to the Installation and Maintenance handbook for the controller.

If the handset being used has only a single-line display of less than 20 characters, refer to section 3.10 on page 21.

The old-style single-line Oyster handsets used the initial prompt to choose between its two speeds of 300 or 1200 baud. Since this initial prompt is no longer generated, the Oyster handset must be explicitly told to use 1200 baud before any other keys will function.

The first two keys on the top row select 300 and 1200 baud as detailed by the legend printed above them. Therefore, to select 1200 baud, simply press the 'BS' (backspace) key on the Oyster handset after it has powered up.

Once the baud rate has been selected, the handset will send any key presses to the controller, which will initially be used by the controller to determine the baud rate.

Therefore the 'BS' key should be pressed a number of times to firstly select 1200 baud; the controller will use subsequent key presses to determine the baud rate used by the handset. Also, by pressing 'BS' rather than 'return', no prompt is generated after the 'SIEMENS' banner and thus this remains on the screen.

3.12.3 Oyster 4/80

This section describes how to set up the Oyster 4/80 terminal for use as a handset. These settings are the same for many other types of traffic controller.

1) Connect the terminal to a controller.

2) Press ‘Cntrl’ and then ‘CR’, this starts the set-up function.

3) For each option, press ‘Y’ to step through the different settings until the required one is displayed, then press ‘N’ to select that setting as detailed below:

Handset Display	User Action Required
`BAUD=1200` `CHANGE ?`	Press ‘Y’ until ‘`1200`’ is displayed, Then press ‘N’.
`WORD=7D+E+1 STOP` `CHANGE ?`	Press ‘Y’ until ‘`7D+E+1 STOP`’ is displayed, Then press ‘N’.
`LINE MODE` `CHANGE ?`	Press ‘Y’ until ‘`LINE MODE`’ is displayed, Then press ‘N’.
`FOUR LINE MODE` `CHANGE ?`	Press ‘Y’ until ‘`FOUR LINE MODE`’ is displayed, Then press ‘N’.
`FLASHING OFF` `CHANGE ?`	Press ‘Y’ until ‘`FLASHING OFF`’ is displayed, Then press ‘N’.
`KEY REPEAT OFF` `CHANGE ?`	Press ‘Y’ until ‘`KEY REPEAT OFF`’ is displayed, Then press ‘N’.
`MAKE CHANGES` `PERMANENT Y/N ?`	Press ‘Y’ to save the settings.
`ARE YOU SURE ?`	Press ‘Y’ to confirm saving the settings.

4) The required settings for communications with most Siemens traffic equipment have now been saved.

5) If at any time ‘Ctrl’ is pressed, continue to press ‘N’ until the normal display is returned.

3.12.4 TechTerm

This section describes how to set up the TechTerm terminal for use as a handset. These settings are the same for many other types of Traffic Controller.

To enter the set parameters mode, simultaneously hold the CTRL and SHIFT keys while pressing F1. To move through the possible values for this parameter, press F1. To move through the list of parameters, press F2 to move forward or F3 to move backward. Both F4 and F5 return to terminal mode. Exiting by pressing F5 will provide an opportunity to save the selected values in the built-in non-volatile memory. Press F4 to exit without saving the settings. Exiting without saving the settings will leave any new setting in effect only until power is removed.

The terminal may be returned to the delivered configuration by applying power while simultaneously holding the CTRL, SHIFT and F1 keys. After the “SAVING DATA” message has appeared, the keys can be released. The procedure returns all of the parameters and the programmable function keys to the delivery configuration. Any changes made to the parameters and characters previously programmed into the function keys will be lost.

PARAMETER	OPTIONS (recommended settings are in bold)
BAUD	300-600-**1200**-2400-4800-9600
DATA BITS	**7**-8
PARITY	**EVEN**-ODD-MARK-SPACE-IGNORE
DISPLAY PE	ENABLE-**DISABLE**
REPEAT	**SLOW**-FAST-DISABLE
ECHO	ENABLE-**DISABLE**
HANDSHAKE	ENABLE-**DISABLE**
SELF TEST	ENABLE-**DISABLE**
POWER SAVER	**ENABLE**-DISABLE*

* Battery operated units only

4 CONTROLLER FAULTS

4.1 Introduction

The controller holds a list of all the faults confirmed by the Controller Application.

When the controller detects a fault, it sets the associated fault flag (to a non-zero value, usually 255) and may also set additional fault data bytes. If any fault flags are non-zero, the red system error LED on the CPU Card is illuminated.

In addition to the above list of currently active faults, there is the time stamped historic 'System Log', which records the time and date that various events occurred, such as when faults were detected and cleared.

4.2 Checking for Active Faults

To display the currently active fault flags, enter 'FFS↵' (fast fault scan), and for the fault data, enter 'FDS↵' (fast data scan).

The '+' and '-' keys can then be used to scroll through the active faults. When there are no more faults, '`FFS END OF LOG`' is displayed.

For backwards compatibility, the 'FLF' (fault log flags) and 'FLD' (fault log data) handset commands still exist.

4.3 Clearing Faults

Entering 'RFL=1' attempts to 'Reset the Fault Log', clearing any active fault flags where the problem no longer exist. It extinguishes the red system error LED on the CPU Card providing no active faults remain.

Note that the System Log is not cleared by entering RFL=1.

This MUST ONLY be used after active fault flags have been investigated.

If the RFL display on the handset changes to 'RFL:0' after having been entered as a '1' and the error LED is also extinguished, all the fault flags have been cleared.

If the RFL display on the handset changes to 'RFL:0' after having been entered as a '1' and the error LED is not extinguished, the controller believes the fault still exists and the fault flag(s) remain set.

If the RFL display on the handset changes to 'RFL:2' after having been entered as a '1', the controller needs to be restarted before the fault can be cleared. This is usually because the fault has caused the controller to shutdown, or the clearance of the fault can only be confirmed at power-up. Under these circumstances, the error LED will not be extinguished and the fault flag remains set until the power is switched off and back on.

4.4 Fault Data Cross-Reference

The table below shows the fault flags that include additional fault data, and is sorted in order of the fault data allowing the associated fault flag to be found. All the fault flags of the controller are described in detail on the following pages…

Fault Data	Description	Fault Flag
FLD 0 to FLD 2	Not Currently Used	
FLD 3	Relay Tests Failed	FLF 4 RLAY
FLD 4	Watchdog Tripped	FLF 8 WDOG
FLD 5	Memory Fault	FLF 11 MEM
FLD 6	Not Currently Used	
FLD 7 to FLD 9	Configuration / Firmware Not Compatible	FLF 21 CPAT
FLD 10 to FLD 12	Phase Bus Checks Fail	FLF 2 PBUS
FLD 13	LSLS Power Failure	FLF 9 LSPF
FLD 14	LSLS Lamp Supply Failure	FLF 17 LSUP
FLD 15	LSLS Major Internal Fault	FLF 42 LSMF
FLD 16 to FLD 17	Limit Green Watchdog	FLF 25 LGRN
FLD 18	Special Conditioning – General Fault 1	FLF 27 SCF1
FLD 19	Special Conditioning – General Fault 2	FLF 28 SCF2
FLD 20 to FLD 31	No Longer Used (previously used by FLF12)	(FLF 12 DFM)
FLD 32	Priority DFM Failure	FLF 18 PDFM
FLD 33 to FLD 49	Not Currently Used	
FLD 50 to FLD 65	Conflict Detected	FLF 5 CFT
FLD 66 to FLD 75	Not Currently Used	
FLD 76 to FLD 77	CPU Crystal Frequency Wrong	FLF 48 FREQ
FLD 78 to FLD 79	Expansion I/O Card Missing or Wrong Type	FLF 13 IOB
FLD 80	Stand-alone Pedestrian Stream Link Fail	FLF 53 LINK
FLD 81	Not Currently Used	
FLD 82	Not Currently Used	
FLD 83 to FLD 90	Red Lamp or Last Lamp Fault	FLF 22 RLM
FLD 91	LSLS or CIC Card Missing	FLF 43 SPB
FLD 92 to FLD 127	Correspondence Failure	FLF 3 CORR
FLD 128 to FLD 129	Not Currently Used	
FLD 130 to FLD 153	Faulty LSLS Output	FLF 33 LOUT
FLD 154 to FLD 249	Not Currently Used	

4.5 Description of the Fault Flags

The table starting over the page describes the meaning of each of the fault flags.

In the ‘Flag’ column is the Fault Flag’s identifying number. Under this number is an indication as to whether the fault causes the controller to shutdown and whether manual invention is required. These indications are explained below.

SHUTDOWN	This fault always causes the controller to shutdown to signals off or hardware fail flash. Manual Reset is always required; typically using the handset command RFL and switching the power to the controller OFF and ON (see section 4.3).
SIGNALS OFF	The fault causes the signals to be extinguished. These faults are typically logged while there appear to be problems with the incoming mains supply to the controller, such as voltage too low. When the fault is cleared, the signals will restart through the Start-Up Sequence.
SIGNALS OFF / FLASH	As for ‘Signals Off’, except the signals will flash if the lamp supply is present but below a configured threshold and ‘Fail to Part-Time’ is configured to flash the signals.
SIGNALS REMAIN ON	This fault does not extinguish the signals by default, although it can (if required) be configured to switch the signals off or shutdown.
MANUAL RESET	Manual Reset is required to clear the fault flag, typically using the RFL handset command (see section 4.3). May require switching the power to the controller OFF and ON if the check is only performed on power-up.
AUTOMATIC RESET	The fault flag is automatically cleared when the controller confirms that the fault condition has ceased. The handset command RFL may have no effect on the fault flag.
⋆⋆⋆	Refer to the text in the Description of the Fault Flag for details.

Flag	Description

0 FLF 0 – Not Currently Used

1 FLF 1 – Conflict config data consistency checks failed

SHUTDOWN

```
CFTF FLF 1:255
```

The controller has detected an inconsistency in the configuration data used to detect conflicting phases. To record which phase conflicts appear to be at fault, one of the following faults will also be set.

- LV or Plus+: The fault FLF 5:255 (page 38)
- ELV: The fault FLF 33:4 (page 52)

If this fault occurs, the IC4 configuration files should be sent to Siemens for investigation. The user should also check the IC4 configuration for any errors, particularly the intergreen and conflict tables, recompile the configuration using IC4 and try again.

2 FLF 2 – SEC/PHP/LSC check failed

SHUTDOWN

```
PBUS FLF 2:N, FLD 10:X, FLD 11:Y, FLD 12:Z
```

The controller will switch off the signals and set this fault flag if a problem is confirmed by (or with) the phase bus system comprising the SEC CPU, the PHP CPU and the Lamp Switch Cards.

The following faults are used to identify failed integrity checks and should only be generated by faults on the CPU Card, therefore try replacing it.

FLF 2:1 – Phase Bus Processor RAM fault
FLF 2:2 – Phase Bus Processor Firmware checksum fault
FLF 2:3 – Incompatible configuration
FLF 2:4 – Phase Bus Processor configuration checksum fault
FLF 2:5 – Message time-out (Primary CPU temporarily stopped)
FLF 2:6 – Unknown message from Primary CPU
FLF 2:7 – Phase Bus Processor internal software fault
FLF 2:8 – Phase Bus Processor Hardware Incompatible
FLF 2:9 – Controller / Phase Bus Processor Incompatible
FLF 2:44 – SEC CPU watchdog triggered

Flag	Description

2 (CONT.) **FLF 2 – Phase Bus Processor Checks Fail (continued)**

The values 10 to 19 are used to identify failed hardware integrity checks and should only be generated by faults on the lamp switch cards or the ribbon cable to the cards.

FLF 2:10 – Lamp switch card fault, e.g. not enough cards fitted
FLF 2:13 – Unexpected red current fault (not fitted in most controllers)

The fault **FLF 2:10**, FLD 10:0, FLD 11:0, FLD 12:1 will be set if the variant of the Lamp Switch Card (e.g. **LED Lamp Switch**) does not match the KLV setting (page 132).

For other faults, try replacing each card in turn. Also consider using the 'Self-Test' facility that will test any number of cards fitted (see the Installation, Commissioning and Maintenance Handbook for details on the Self-Test)

The following faults are generated by the secondary safety checking facilities provided by the phase bus processor. Normally the Primary CPU should detect, confirm and report the following types of faults before the phase bus processor so these faults should never appear. If one of these faults were logged, it would imply that the Primary CPU has missed the fault, possibly due to a configuration error or fault with the CPU Card.

FLF 2:20 – Correspondence fault
FLF 2:21 – Half cycle correspondence fault
FLF 2:22 – Conflict fault (e.g. phases with intergreen both at green)
FLF 2:23 – Any green fault (not currently used)
FLF 2:24 – Last red fault
FLF 2:25 – ZXO missed fault
FLF 2:26 – Audible/Tactile fault (e.g. conflicting phases not at red)
FLF 2:45 – Conflict detected in the requested states
FLF 2:46 – Inconsistent polling fault (Plus+)
FLF 2:47 – Correspondence fault (Plus+) – requested on but not on
FLF 2:48 – Correspondence fault (Plus+) – requested off but not off
FLF 2:49 – Correspondence fault (Plus+) – no matching request
FLF 2:50 – Correspondence fault (Plus+) – missing Reds for conflicting Green

Note: Plus+ correspondence faults can be triggered if Plus+ Communications are poor.

The following fault is always reported internally by the PHP CPU (LV) or SEC CPU (ELV) when it is instructed to shut down by the Primary CPU. If it does appear against this fault flag, it would imply a fault with the communications between the CPU; try replacing the CPU Card.

FLF 2:30 – Shutdown message from Primary CPU

Flag	Description

2 (CONT.) **FLF 2 – Phase Bus Processor Checks Fail (continued)**

The following faults are generated by the SEC CPU and imply a mismatch between the configurations in the Primary and SEC CPUs. Try the reprogramming sequence again or replacing the CPU Card.

- **FLF 2:31** – No requests but Relay B On
- **FLF 2:32** – Mismatch of configuration data
- **FLF 2:33** – Missing RQP message
- **FLF 2:34** – Missing RQUK message
- **FLF 2:35** – Wrong 'Go' message received (LV)
- **FLF 2:36** – Wrong 'Go' message received (ELV)
- **FLF 2:37** – Phase Bus message from LSLS when LV
- **FLF 2:38** – Phase Bus message from Primary when LV
- **FLF 2:39** – Missing RPUK message
- **FLF 2:42** – Wrong 'Go' message received (Plus+)
- **FLF 2:43** – Unrecognised 'Go' message received

The following faults are generated by the check in the SEC CPU that compares the CPU crystal frequencies of the Primary and SEC CPUs and imply a fault with the CPU Card.

- **FLF 2:40** – Crystal Check fault
- **FLF 2:41** – No Crystal Check activity

For values 42 to 199, see the tables above.

For values 200 to 255, see the table over the page.

Flag	Description

2 (CONT.) FLF 2 – Phase Bus Processor Checks Fail (continued)

The following faults are generated by the Primary CPU when it detects a problem with the phase bus system or the Controller Application.

FLF 2:200 – PHP Dual port RAM – memory test fault
FLF 2:201 – PHP Dual port RAM – failure to store configuration data
FLF 2:202 – PHP Dual port RAM – configuration data checksum fault
FLF 2:210 – Primary CPU confirmed failure of the Application *
FLF 2:211 – Reserve State detected RLM config fault **
FLF 2:212 – Signals on and TMA test mode requested
FLF 2:213 – A CIC or Node has requested Controller Shutdown (Plus+)
FLF 2:250 – SEC CPU in wrong state (or comms fault)
FLF 2:251 – (Not currently used)
FLF 2:252 – Monitor Validation tests failed ***
FLF 2:253 – PHP Phase Bus firmware is incompatible ****
FLF 2:254 – Comms with the PHP (LV only) or SEC have ceased
FLF 2:255 – PHP Phase Bus Processor not detected on power-up

Other than the fault codes listed below, the FLF2 fault codes of 200+ normally indicate a problem with the CPU Card and thus it should be replaced.

* **FLF 2:210** – The Application stopped before entry to the Reserve State could complete, or the Application failed to return within the timeout period, and controller is configured to shutdown when this occurs. See the description of the RSO command for more information.

** **FLF 2:211** – In Reserve State the Primary has detected that RLM is configured to inhibit all the stages, preventing Fixed Time operation. Check the RLM settings in the IC4 configuration; should all the phases be extinguished rather than inhibited?

*** **FLF 2:252** – The monitor validation system verifies the operation of the phase bus processor by inverting a selection of the voltage monitor signals on the lamp switch cards, therefore a failure of this test may be due to a faulty CPU Card or one of the lamp switch cards or the inter-connecting cables.
On an ELV Controller with more than one LSLS Card, the fault may also be caused by a mismatch of the HFF settings or by supply polarities on the LSLS cards. Check the HFF link on the HPU matches that required by the IC4 configuration. If two ELV transformers and HPU are fitted, check the Live / Neutral connections have not been reversed. If a new lamp supply transformer has been fitted, it may be faulty (AC logic power to one LSLS card reversed will cause its ZXO to be out of phase with other LSLS cards).

**** **FLF 2:253** – The SIC handset command shows the PHP firmware version. Check the document 667/SU/46000/000 for the latest compatibility information.

Flag	Description

3 FLF 3 – Correspondence failure

★★★ CORR FLF 3:255, E/GRN NOTON

The Primary CPU has detected a mismatch between the requested and actual states of the signals on the street. May also be referred to as an 'Equivalence' or 'Compliance' fault. The Self-Test facility may be able to cast more light on the problem.

★★★ How the Controller reacts to Correspondence faults depend on how it is configured as explained below

LV/ELV Controller and 'Fail to Part-Time' is not enabled:

The controller will always shutdown when a fault with a green output is confirmed. Faults with red, amber and switched sign outputs can be configured to do the same or just record a fault. In the latter case, RFL=1 will always clear the fault flag, but the fault will be re-reported if it is detected again by the controller.

LV/ELV Controllers and 'Fail to Part-Time' is enabled:

Note: 'Fail to Part-Time' is also known as software fail flash
The stream will immediately move to its part-time state when a fault with a green output is confirmed. Faults with red, amber and switched sign outputs can be configured to do the same or just record a fault. While in this part-time failure state, a fault confirmed with a green output will always cause shutdown, whereas faults with red and amber outputs can be configured to shutdown or just record a fault.

Plus+ Controllers and 'Fail to Part-Time' is not enabled:

All the signals are extinguished when a Phase Colour is requested on, but no such signals are detected – also known as 'not on' or 'missing signals' faults. The check is applied to all Phases and all Colours. The fault will clear automatically if communications to the missing Nodes are reestablished for example. When the fault is cleared, the signals switch on via the configured start-up sequence. Faults where a signal appears 'stuck on' are normally detected by the Plus+ Node and are 'removed' by that Node switching off, but if the fault persists the Controller is shutdown.

Plus+ Controllers and 'Fail to Part-Time' is enabled:

A stream will immediately move to its part-time state when 'not on' faults are detected on that stream. The check is applied to all Phases and all Colours. The fault will clear automatically if communications to the missing Nodes are reestablished for example. When the fault is cleared, the stream moves from part-time to normal operation via the configured start-up sequence.

Continued overleaf…

Flag	Description

3 (CONT.) **FLF 3 – Correspondence failure (continued)**

The following Correspondence faults can be logged.

`CORR FLF 3:255, (ALL OFF)`
None of the signals are illuminated, check the lamp supply connections.

`CORR FLF 3:255, E-H NOTON`
The given group of four phases was not illuminated. On LV Controllers, check the lamp supply fuses because each fuse protects four phases (except fail flashing).

`CORR FLF 3:255, A/RED STKON`
The output for the given phase and colour is 'stuck on'.
LV/ELV Controllers: the solid-state switch for the output has not switched OFF, the voltage monitors for that output are faulty, or there is a 'short-circuit' in the street cabling between this and another output that is ON.

`CORR FLF 3:255, B/AMB NOTON`
The output for the given phase and colour is 'not on'.
LV/ELV Controllers: the solid-state switch for the output has not switched ON, the voltage monitors for that output are faulty, or the lamp supply to that output has failed.
Plus+ Controllers: no Plus+ Signals were detected as 'on'; check the required Nodes and Signals are working.

`CORR FLF 3:255, C/GRN CH1/2`
The two monitoring channels for the output for the given phase and colour do not agree because the TRIAC is half-cycling (i.e. is ON for one half cycle but not the other), one of the voltage monitor channels for that output is faulty or an external DC voltage is being applied to the AC output of the controller.

`CORR FLF 3:255, … PLUS OTHERS`
The System Log will list up to eight individual correspondence fault entries, but if more than eight individual faults have been detected, '`PLUS OTHERS`' will be displayed after the last.

Continued overleaf…

Flag	Description

3 (CONT.) **FLF 3 – Correspondence failure (continued)**

Fault Data (FLD)

The fault data bytes FLD 92 to FLD 127 detail the requested states of all the signals and the actual states detected by the voltage monitors. One binary bit per phase, where '1' indicates requested or detected 'ON'. For example, if phase E green is half cycling, the fault data would show:

```
          HGFEDCBA
FLD  92:00111001 – Requested reds Phases H…A, e.g. Phases A,D,E,F at Red
FLD  93:00111001 – Actual reds H…A – channel 1 monitors (+ve)
FLD  94:00111001 – Actual reds H…A – channel 2 monitors (-ve)
FLD  95:00100010 – Requested ambers Phases H…A, e.g. Phase B & F Ambers ON
FLD  96:00100010 – Actual ambers H…A – channel 1 monitors (+ve)
FLD  97:00100010 – Actual ambers H…A – channel 2 monitors (-ve)
FLD  98:11000100 – Requested greens Phases H…A, e.g. Phases C,G,H at Green
FLD  99:11010100 – Actual greens H…A – channel 1 monitors (+ve)
FLD 100:11000100 – Actual greens H…A – channel 2 monitors (-ve)
          PONMLKJI
FLD 101:XXXXXXXX – Requested reds Phases P…I
FLD 102:XXXXXXXX – Actual reds P…I – channel 1 monitors (+ve)
FLD 103:XXXXXXXX – Actual reds P…I – channel 2 monitors (-ve)
FLD 104:XXXXXXXX – Requested ambers Phases P…I
FLD 105:XXXXXXXX – Actual ambers P…I – channel 1 monitors (+ve)
FLD 106:XXXXXXXX – Actual ambers P…I – channel 2 monitors (-ve)
FLD 107:XXXXXXXX – Requested greens Phases P…I
FLD 108:XXXXXXXX – Actual greens P…I – channel 1 monitors (+ve)
FLD 109:XXXXXXXX – Actual greens P…I – channel 2 monitors (-ve)
          XWVUTSRQ
FLD 110:XXXXXXXX – Requested reds Phases X…Q
FLD 111:XXXXXXXX – Actual reds X…Q – channel 1 monitors (+ve)
FLD 112:XXXXXXXX – Actual reds X…Q – channel 2 monitors (-ve)
FLD 113:XXXXXXXX – Requested ambers Phases X…Q
FLD 114:XXXXXXXX – Actual ambers X…Q – channel 1 monitors (+ve)
FLD 115:XXXXXXXX – Actual ambers X…Q – channel 2 monitors (-ve)
FLD 116:XXXXXXXX – Requested greens Phases X…Q
FLD 117:XXXXXXXX – Actual greens X…Q – channel 1 monitors (+ve)
FLD 118:XXXXXXXX – Actual greens X…Q – channel 2 monitors (-ve)
          FEDCBAZY
FLD 119:XXXXXXXX – Requested reds Phases F2…Y
FLD 120:XXXXXXXX – Actual reds F2…Y – channel 1 monitors (+ve)
FLD 121:XXXXXXXX – Actual reds F2…Y – channel 2 monitors (-ve)
FLD 122:XXXXXXXX – Requested ambers Phases F2…Y
FLD 123:XXXXXXXX – Actual ambers F2…Y – channel 1 monitors (+ve)
FLD 124:XXXXXXXX – Actual ambers F2…Y – channel 2 monitors (-ve)
FLD 125:XXXXXXXX – Requested greens Phases F2…Y
FLD 126:XXXXXXXX – Actual greens F2…Y – channel 1 monitors (+ve)
FLD 127:XXXXXXXX – Actual greens F2…Y – channel 2 monitors (-ve)
```

Phase E Green: Actual state (+ve) does not match Requested state

Flag	Description

4 FLF 4 – Lamp supply relay checks failed

SHUTDOWN

```
RLAY FLF 4:N, FLD 3:XXXXXXXX
```

The relay tests try to detect lamp supply relay faults while the controller is operating normally with the lamp supply ON. By opening just the relay under test, the lamp supply should still switch off unless that relay or its drive circuits are faulty. If the lamp supply is not switched off, this fault is raised.

Note: If any relay is stuck open circuit, the lamp supply fault (FLF17 page 44) will detect no lamp supply.

The fault data will indicate the faulty relay:

`FLF 4:1, FLD 3:00000001` – Relay A appears to be stuck short circuit
`FLF 4:2, FLD 3:00000010` – Relay B appears to be stuck short circuit*
`FLF 4:4, FLD 3:00000100` – SSR appears to be stuck short circuit*
`FLF 4:8, FLD 3:00001000` – Hardware Fail Flash fault **

Relay faults can be caused by a problem in these areas:

- LV Controllers only - The Mains Distribution Unit (MDU).
- ELV Controllers only - The High Power Unit (HPU).
- Plus+ controllers only - One or more CIC cards could be faulty (setting FLF 42).
- The drive circuits on the CPU Card.
- The cables between these modules.

SelfTest may be able to provide more information.

* May be reported if no lamps are connected to the controller.

** Check the Hardware Fail Flash (HFF) setup of the controller. HFF is a non-UK facility to flash Amber or Red signals on fault conditions. This fault is reported if:

- HFF is not configured, but the HFF ‘FLASH’ switch is ON (behind the 25-way Handset connector the CPU Card).
- HFF is configured, but only 1 LSLS card is fitted.
- HFF is configured, but the ELV HPU link is not in the HFF position.
- HFF is not configured, but the ELV HPU link is in the HFF position.
- HFF is not configured, but LSLS #1 not switched off by the Relay, i.e. Relay fault.

Flag	Description

5 FLF 5 –Conflict Detected

SHUTDOWN

```
CFT FLF 5:255, C+G
```

The Primary CPU has extinguished the signals because it was about to illuminate conflicting aspects of the given phases, phase C and G in this example, which have been configured as conflicting, i.e. there is a fault in the configuration. Also refer to the description of FLF1 if that fault is also set.

Also remember that, if enabled, these checks include green/amber conflicts as well as green/green conflicts.

The first 4 bytes of fault data show the conflicting phases:

`FLD 50:01000100` – Conflicting phases H…A
`FLD 51:00000000` – Conflicting phases P…I
`FLD 52:00000000` – Conflicting phases X…Q
`FLD 53:00000000` – Conflicting phases F2…Y

The next 12 fault data bytes show the requested lamp states:

`FLD 54:00111001` – Requested reds H…A
`FLD 55:00100010` – Requested ambers H…A
`FLD 56:11000100` – Requested greens H…A
`FLD 57:11100000` – Requested reds P…I
`FLD 58:00000000` – Requested ambers P…I
`FLD 59:00000000` – Requested greens P…I
`FLD 60:00000000` – Requested reds X…Q
`FLD 61:00000000` – Requested ambers X…Q
`FLD 62:00000000` – Requested greens X…Q
`FLD 63:00000000` – Requested reds F2…Y
`FLD 64:00000000` – Requested ambers F2…Y
`FLD 65:00000000` – Requested greens F2…Y

Flag	Description

6 FLF 6 – No ZXO detected (on LV/ELV Controllers)

SIGNALS OFF AUTOMATIC RESET

`NZXO FLF 6:255` (LV/ELV)

The **LV/ELV Controller** cannot synchronise to the mains' zero cross over signal and thus has extinguished all the signals. Check the connections from the power distribution unit (MDU or HPU) to the first lamp switch card and check that the first lamp switch card is connected to the CPU Card.

This fault will be automatically cleared when the controller has successfully synchronised to the mains.

---

6 FLF 6 – No ZXO detected (on Plus+ Controllers)

SIGNALS REMAIN ON AUTOMATIC RESET

`NZXO FLF 6:254` (Plus+)

The **Plus+ Controller** cannot synchronise to the mains' zero cross over signal, so the Real Time Clock has switched to Crystal mode. Note that a Plus+ Controller does not require ZXO to control/monitor the traffic signals.

If a Mains Synchronised Clock is required, check the optional kit containing a small isolating transformer is fitted and connected to CIC #1. This fault will clear automatically when the controller has successfully synchronised to the mains.

If a Mains Synchronised Clock is not required, change the clock settings and the fault will clear automatically.

Flag	Description

7 FLF 7 – Controller Time is not set

SIGNALS REMAIN ON MAN / AUTO RESET

```
RTC FLF 7:255
```

This flag is set when:

- the controller is first powered up to indicate that the real time clock needs setting to the correct time,
- the length of the power break exceeds the clock support capability, see FLF 50 on page 55,
- the contents of the real time clock device appear to be corrupt, or
- the controller has been without mains power for longer than the configured power fail time, see PFT.

Use the handset command TOD to set the clock; this fault will clear when the clock is set manually. If the clock is configured to follow network NTP or GPS, the clock will be set from those sources and this fault will be cleared automatically. For a mains synchronised clock, refer to section 7.1 starting on page 81.

8 FLF 8 – Primary CPU watchdog checks failed

SHUTDOWN

```
WDOG FLF 8:N, FLD 4:XXXXXXXX
```

The watchdog systems for the Primary CPU have detected a fault:

```
  FLF 8:1, FLD 4:00000001 – Hardware watchdog timed-out
  FLF 8:2, FLD 4:00000010 – TWD command entered (page 68)
  FLF 8:4, FLD 4:00000100 – 20ms software count incorrect
  FLF 8:8, FLD 4:00001000 – 200ms software count incorrect
 FLF 8:16, FLD 4:00010000 – ZXO/peak software count incorrect
 FLF 8:32, FLD 4:00100000 – Primary CPU clock frequency fault
 FLF 8:64, FLD 4:01000000 – Not used
FLF 8:128, FLD 4:10000000 – 200ms software fault
```

Treat all these faults (except FLF 8:2) as a faulty CPU Card.

Flag	Description

9 FLF 9 – ELV LSLS / Plus+ CIC card failed to power up or is missing

SIGNALS OFF
AUTOMATIC RESET

`LSPF FLF 9:255, FLD 13:XXXXXXXX` (ELV)
`LSPF FLF 9:254, FLD 13:XXXXXXXX` (Plus+)

`FLD 13:XX000001` – Card 1 missing or faulty
`FLD 13:XX000010` – Card 2 missing or faulty
…through to…
`FLD 13:XX100000` – Card 6 missing or faulty
`FLD 13:01XXXXXX` – Card(s) reported no ZXO
`FLD 13:10XXXXXX` – Card(s) reported low power

Records which LSLS or CIC cards have not been detected at power-up or have powered down during a Mains Break or Brownout. Automatically cleared when the card returns to normal operation.

The fault is not set during 'normal' mains breaks. If the fault is set, check whether mains supply is very low or whether card(s) are faulty.

On ELV Controllers:

If either of the top two bits are set, one or more of the LSLS cards have reported problems with ZXO (typically due to repetitive mains interruptions) or low power, for example:
`FLD 13:01000011` – LSLS 1 and 2 reported low power

Check the Status LEDs on all the LSLS Cards, e.g.
- LED-A Red continuous = Major Fault; LSLS Card has failed.
- LED-A & LED-B yellow continuous = low logic power (held reset).
- LED-A OFF, LED-B flashing = Normal operation or awaiting start.

(For more information on these LEDs, refer the ELV controller maintenance handbook)

For Plus+ Controllers:

Check the Status LEDs on all the CICs, e.g.
- COMM-A OFF = No SPB transmission.
- COMM-B OFF = No GSPI transmission.
- FLT-A continuous Red = CPUA is faulty.
- RUN-A Not Flashing = CPUA not running.
- FLT-B continuous Red = CPUB is faulty.
- RUN-B Not Flashing = CPUB not running.

(For more information on these LEDs, refer to the Plus+ handbook)

10 FLF 10 – Not Currently Used

Flag	Description

11 FLF 11 – Primary CPU memory fault

SHUTDOWN

`MEM FLF 11:N, FLD 5:XXXXXXXX`

The Primary CPU has detected a memory fault. For problems with the FLASH memory contents, try reprogramming the FLASH memory using the PROGRAM pushbutton (using the same procedure as for updating the IC4 configuration or firmware).

`FLF 11:1, FLD 5:00000001` – Program checksum failure

A full check of the program FLASH memory is always performed on every power-up. The above fault is raised by the background check of the program area and thus would imply an intermittent fault with the CPU Card.

`FLF 11:8, FLD 5:00001000` – Junction configuration data corrupt

The checksum check covering the junction configuration data has failed. This data resides in FLASH memory.

`FLF 11:16, FLD 5:00010000` – RAM timings data corrupt

The checksum check covering the configuration timings has failed. This data resides in RAM because it is updated by the Controller Application. This fault may be cleared by resetting the fault and restarting the controller. If the fault returns, consider replacing the CPU Card.

`FLF 11:128, FLD 5:10000000` – Safety configuration data is corrupt

The checksum check covering the safety configuration data has failed. This data resides in FLASH memory.

12 FLF 12 – DFM – Detector Fault Monitor faults

SIGNALS REMAIN ON
MANUAL RESET

`DFM L95 IN12H`

Detector fault monitor failure, i.e. the given I/O line has been stuck active or inactive for longer than the configured time. The handset command ‘DSF’ identifies the faulty I/O lines, see page 75.

When RFL=1 is entered to clear this fault, it will automatically initiate a kerbside test. If the kerbside detector passes this test, the FLF entry is cleared.

See overleaf for examples…

Flag	Description

12 (CONT.) FLF 12 – DFM – Detector Fault Monitor faults (continued)

Examples:

DFM L16 AC30M.... I/O Line 16 detected permanently active for 30 minutes.

DFM L17 IN8H ..... I/O Line 17 detected permanently inactive for 8 hours.

DFM L17 CHNGD .. I/O Line 17 changed state after being reported faulty.

DFM L17 CLEAR.... The DFM fault on I/O Line 17 has been cleared.

DFM L18 KERBF.... I/O Line 18 has failed the kerbside test procedure.

DFM L18 KERBP ... I/O Line 18 subsequently passed the kerbside test.

DFM L18 KERBC ... The kerbside test fault on I/O Line 18 has been cleared.

13 FLF 13 – I/O Card Missing or Wrong Type

SIGNALS REMAIN ON MANUAL RESET

`IOB FLF 13:255, FLD 78:XXXXXXXX, FLD 79:XXXXXXXX`

The Controller Application is not able to detect all the I/O cards required by this IC4 Configuration and so has set this fault flag. Also see the command 'IOB'.

The fault will be automatically cleared when the card is detected after a restart. While a card is faulty, all inputs from the card will appear open-circuit, except those configured to be forced active/inactive on a DFM failure (see DFA on page 75).

`FLD 79:00000010` – I/O Card address 1 has failed or is the wrong type
…through to…
`FLD 79:10000000` – I/O Card address 7 has failed or is the wrong type
…and…
`FLD 78:00000001` – I/O Card address 8 has failed or is the wrong type
…through to…
`FLD 78:10000000` – I/O Card address 15 has failed or is the wrong type

If the communications LED on the I/O card is still flashing, it is likely that the card type does not match that required by the configuration. Check the IC4 printout or I/O Cards web page. If the I/O Card is not listed in the IC4 printout and the I/O Card is not being used by the Controller Application, the controller's IOB setting for the card should be zero, even if the card is being used by other applications within the ST950. Also remember that the ST950 cannot communicate with older I/O cards fitted to ST900 controllers (I/O card firmware prior to issue 3).

Tip! If a faulty WiMag I/O Card also reports the fault 'Environment error' (GSPI generic status code 0x0D), it may indicate a problem with the Ethernet link between the WiMag card and the WiMag Access Point, rather than a problem with the communications between the ST950 and the WiMag I/O Card.

14 FLF 14 – Not Currently Used

Flag	Description

15 FLF 15 – Primary & Application configurations differ

SHUTDOWN

```
DIFC FLF 15:255
```

On power-up, the Primary CPU has detected that its configuration differs from that in the Controller Application. If a new configuration has just been loaded, ensure that the correct procedure has been used. For example, ensure that the programming sequence is allowed to complete before the power is switched off. Try repeating the programming sequence.

16 FLF 16 – Firmware update or failed to restore data on power-up

SHUTDOWN

```
NEWF FLF 16:255
```

On power-up, the controller has been unable to restore the state of some working data or configuration data. This fault can occur when the firmware is first loaded in to the CPU Card. Note that a firmware update will normally preserve this data. Error events in the System Log identify the areas of data that has not been restored but instead has been initialised to their default values. The lamps remain off until this fault flag has been manually reset.

17 FLF 17 – Lamp supply failure

SIGNALS OFF / FLASH
AUTOMATIC RESET

```
LSUP FLF 17:255, FLD 14:X0XXXXXX
```

While the supply is confirmed as faulty, the controller will extinguish all the traffic signals, see page 64. RFL=1 has no effect on this fault. The fault will be automatically cleared when the supply is restored and the traffic signals will illuminate via the defined start-up sequence.

Important

If the signals are switched off after this fault has been raised (using the manual panel signals on/off switch for example), the fault may not be cleared until the signals are switched back on and the controller can confirm that the lamp supply has been restored.
Also check that FLF17 is not marked as an ‘Act Flag’ on the IC4 page “Fault Log Flags” because this will prevent the controller from switching on the supply and checking that the voltage has recovered.

If the traffic signals have been restarted due to short dips in the incoming supply, due to short mains brownouts for example, FLF 17 fault occurrence and clearance events will appear in the System Log. Alternatively, if during the short duration dip, the mains supply is completely removed, the events ‘Signal power lost’ and ‘Signal power available’ are logged instead.

Continues overleaf…

Flag	Description

17 (CONT.) **FLF 17 – Lamp supply failure (continued)**

LV Controllers

The lamp supply has dropped below the configurable thresholds LBT/LDT (e.g. low mains supply) or is simply not present (e.g. fuse blown). On these controllers, FLD 14 is not used.

ELV Controllers

The lamp supply on one or more LSLS cards is outside the required voltage bands, or is simply not present (e.g. fuse blown). The fault data identifies the LSLS cards on which the fault has been found, e.g. FLD 14:00000001 for LSLS #1 and FLD 14:00111111 for all 6. If the top bit is also set (e.g. FLD 14:10XXXXXX), the lamp supply is too high.

Check the fuses on the HPU if all the cards from that HPU are marked as faulty.

If all cards are faulty, check the lamp supply reading, using the 'KEV' handset command (see page 64). If the reading appears significantly different from the nominal supplies 48V (bright) or 27.5V (dim), carefully measure the incoming mains supply to the controller and consider changing the 'tap' on the lamp supply transformer if the measured voltage does not match the 'tap' used. For example, if the lamp supply (KEV) appears high and the mains voltage is also high, e.g. between 240V and 250V, but the mains input is connected to the 230V tap on the transformer, consider moving the mains input to the 240V tap.

---

18 **FLF 18 – Priority DFM failure**

SIGNALS REMAIN ON MAN / AUTO RESET

```
PDFM FLF 18:255, FLD 32:XXXXXXXX
```

The controller has detected a DFM fault on the (bus) priority unit(s) identified in the fault data.

This fault flag can be automatically cleared if the 'auto-reset' option is used (PDR).

---

19 **FLF 19 – SDE/SA card requested, but not supported**

SHUTDOWN

```
SDEP FLF 19:255
```

The SDE/SA card is required by this configuration, but the controller does not support that card.

---

20 **FLF 20 – Not Currently Used**

Flag	Description

21 FLF 21 – Configuration & Firmware not compatible

SHUTDOWN

CPAT FLF 21:N, FLD 7:N, FLD 8:X, FLD 9:Y

If the configuration data and the controller are not compatible, this fault will be set and the signals will be extinguished.

Many of these compatibility faults are usually caused by the configuration data requiring a later issue of firmware than is fitted. Check that the firmware fitted is the same or a later issue than that specified in the 'Controller And Firmware Type' field on the Administration page of the IC4 printout.

The FLF 21 and FLD 7 code number identifies the source of the incompatibility, with additional information held in FLD 8 and FLD 9.

FLF 21:5 – Invalid Lamp Sequence Command
FLD 8:X – Phase (where zero represents phase A)
FLD 9:Y – Command

FLF 21:6 – Invalid Conditioning Command
FLD 8:X – Command Code (for engineering use only)

FLF 21:7 – Conditioning Timer Out of Range
FLD 8:X – Timer Number Given By X + Y x 256
FLD 9:Y / (for engineering use only)

FLF 21:8 – Attempted Access Outside Conditioning Array
FLD 8:X – Offset Given By X + Y x 256
FLD 9:Y / (for engineering use only)

FLF 21:11 – Conditioning attempted access outside extended fetch array
FLD 8:X – Offset given by X + Y x 256
FLD 9:Y / (for engineering use only)

FLF 21:12 – Feature is not permitted.
FLD 8:X – Hardware Code (for engineering use only)
FLD 9:3 – Only stand-alone ped streams permitted.
The required feature is not permitted on this version of the controller. For example, 'FLD 9:3' will be set if the configuration contains an intersection stream and the controller hardware is a stand-alone pedestrian controller.

FLF 21:13 – The CPU PCB is not compatible with this firmware.
FLD 8:X – Primary ID Bit (for engineering use only)
FLD 9:Y – Sampled value (for engineering use only)

Flag	Description

FLF 21:14 – Special Conditioning stack error (overflow or underflow).
FLD 8:X – Stack position given by X + Y x 256
FLD 9:Y / (for engineering use only)

FLF 21:15 – Special Conditioning SET() value bitmask error.
FLD 8:X – Bit Mask value given by X + Y x 256
FLD 9:Y / (for engineering use only)

22 FLF 22 – RLM – Red Lamp Monitor or Last Lamp fault(s) confirmed

★★★ LAMP FLF 55:255, A/Red 49W, RLM FLF 22:1, A/RLM1 SET

A Red Lamp Monitor or Last Lamp fault has been confirmed that affects the controller's operation. Also see FLF 55.

★★★ The failure actions and reset options are configurable. Normally in the UK a second red lamp fault on a vehicle phase inhibits the conflicting pedestrian phase(s), whereas on a Part Time or stand-alone pedestrian controller, a second red lamp fault on a vehicle phase is normally configured to extinguish all the signals. If red lamp faults extinguish the stream, clearance of the fault usually requires manual reset; refer to section 9.7. A first red lamp fault or a second red lamp fault that only inhibits the appearance of phases can be configured for automatic or manual clearance. Last Lamp Faults trigger the Fail to Part-Time (software fail flash) facility or shutdown.

FLF 22:1 – 1st red lamp fault confirmed.
FLF 22:3 – 2nd red lamp or last lamp fault confirmed.

In the System Log, events of the form listed below will accompany the 'FLF 22' red lamp monitor fault flag entry, rather than the FLD fault data bytes:

```
Phase A-C-- First Red Fault Set (RLM-RF1)
Phase --C-- Second Red Fault Set (RLM-RF2)
Phase A-C-- First Red Fault Cleared (RLM-RF1)
Phase --C-- Second Red Fault Cleared (RLM-RF2)
Phase -B--- Last Lamp Fault Set (RLM-RF2)
Phase -B--- Last Lamp Fault Cleared (RLM-RF2)
```

The fault data indicates on which phases the red lamp failures have occurred:

FLD 83:00000001 – First red lamp fail on phase A
FLD 83:00000011 – Second red lamp fail on phase A
FLD 83:00000010 – Last lamp fail on phase A
FLD 83:00000100 – First red lamp fail on phase B
FLD 83:00001100 – Second red lamp fail on phase B
FLD 83:00001000 – Last lamp fail on phase B

This continues for the rest of the bits in FLD 83, and FLD 84-90 identify failures on the rest of the phases as shown over the page:

Flag	Description

Red Lamp Fault Data in full:

FLD 83:000000XX – Faults on phase A
FLD 83:0000XX00 – Faults on phase B
FLD 83:00XX0000 – Faults on phase C
FLD 83:XX000000 – Faults on phase D

FLD 84:000000XX – Faults on phase E
FLD 84:0000XX00 – Faults on phase F
FLD 84:00XX0000 – Faults on phase G
FLD 84:XX000000 – Faults on phase H

FLD 85:000000XX – Faults on phase I
FLD 85:0000XX00 – Faults on phase J
FLD 85:00XX0000 – Faults on phase K
FLD 85:XX000000 – Faults on phase L

FLD 86:000000XX – Faults on phase M
FLD 86:0000XX00 – Faults on phase N
FLD 86:00XX0000 – Faults on phase O
FLD 86:XX000000 – Faults on phase P

FLD 87:000000XX – Faults on phase Q
FLD 87:0000XX00 – Faults on phase R
FLD 87:00XX0000 – Faults on phase S
FLD 87:XX000000 – Faults on phase T

FLD 88:000000XX – Faults on phase U
FLD 88:0000XX00 – Faults on phase V
FLD 88:00XX0000 – Faults on phase W
FLD 88:XX000000 – Faults on phase X

FLD 89:000000XX – Faults on phase Y
FLD 89:0000XX00 – Faults on phase Z
FLD 89:00XX0000 – Faults on phase A2
FLD 89:XX000000 – Faults on phase B2

FLD 90:000000XX – Faults on phase C2
FLD 90:0000XX00 – Faults on phase D2
FLD 90:00XX0000 – Faults on phase E2
FLD 90:XX000000 – Faults on phase F2

In each case the two bits identified by ‘XX’ above indicate:
01 – First red lamp fault confirmed on that phase
11 – Second red lamp fault confirmed on that phase
10 – Last red lamp fault confirmed on that phase

Flag	Description

23 FLF 23 – Pedestrian Controller Fault (Special Conditioning)

SIGNALS REMAIN ON MAN / AUTO RESET

`PED FLF 23:N`

Reserved for use by Special Conditioning: a fault with the pedestrian inhibit signal to a separate pedestrian controller has been detected.

`FLF 23:1` – The inhibit signal was sent to the Pedestrian Controller, but no inhibit confirm signal was replied.

`FLF 23:2` – The inhibit signal was lifted and a pedestrian demand was present, but after a delay time, the vehicle green confirm signal was not replied, or did not persist while the inhibit signal was active.

`FLF 23:4` – The vehicle green confirm signal disappeared for longer than the delay time.

Two or more faults detected result in the sum of the 2 faults being set, e.g. '`FLF 23:1`' and '`FLF 23:2`' would result in '`FLF 23:3`'.

The delay time mentioned is equal to the sum of the intergreen to the pedestrian phase, the pedestrian phase green time and the intergreen back to the vehicle phase.

24 FLF 24 – LRT Fault (Special Conditioning)

SIGNALS REMAIN ON MAN / AUTO RESET

`LRT FLF 24:N`

Reserved for use by LRT (Light Rail Transit) Special Conditioning, e.g.

`FLF 24:1` – 1st Interrogator/Decoder Fault
`FLF 24:2` – 2nd Interrogator/Decoder Fault.
`FLF 24:3` – 1st and 2nd Interrogator/Decoder Faults.

Flag	Description

25 FLF 25 – Limit green watchdog (Special Conditioning)

SIGNALS REMAIN ON MAN / AUTO RESET

```
LGRN FLF 25:255, FLD 16:XXXXXXXX, FLD 17:XXXXXXXX
```

Reserved for use by Special Conditioning: a limit green watchdog fault for the mode identified by the fault data. The other bits and FLD17 are currently unused.

```
FLD 16:00000001 – Fixed Time Mode
FLD 16:00000010 – CLF Mode
FLD 16:00000100 – Priority Mode
FLD 16:00001000 – Emergency Vehicle Mode
```

26 FLF 26 – Hurry Call monitor fault (Special Conditioning)

SIGNALS REMAIN ON MAN / AUTO RESET

```
HURY FLF 26:N
```

Reserved for use by Special Conditioning: a fault with hurry call mode:

```
FLF 26:1 – Hurry Call Request active for too long
FLF 26:2 – Hurry Call Mode active for too long
FLF 26:3 – Hurry Call Request and Mode Faults
```

27 FLF 27 – Special Conditioning – General Fault 1

SIGNALS REMAIN ON MAN / AUTO RESET

```
SCF1 FLF 27:255, FLD 18:XXXXXXXX
```

This fault flag is available for use by Special Conditioning.

Refer to the configuration's Special Instructions for details on why Special Conditioning has raised this fault.

For example, the Special Conditioning in the standard pedestrian configurations may set FLF 27 if the audible monitor inputs do not match the expected state of the audible outputs. In this case, the Special Conditioning also extinguishes the signals.

Flag	Description
28	**FLF 28 – Special Conditioning – General Fault 2**

SIGNALS REMAIN ON MAN / AUTO RESET

```
SCF2 FLF 28:255, FLD 19:XXXXXXXX
```

This fault flag is available for use by Special Conditioning.

Refer to the configuration's Special Instructions for details on why special conditioning has raised this fault.

29	**FLF 29 – Special Conditioning – Request Fail Flash**

SHUTDOWN

```
FLSH FLF 29:255
```

Special Conditioning has requested shutdown to hardware fail flashing; i.e. it has detected a serious fault that requires the controller to extinguish all the signals and switch on the built-in hardware fail flasher (if enabled).

30	**FLF 30 – ST750ELV Configuration & Hardware Mismatch**

SHUTDOWN

```
T750 FLF 30:255
```

This fault is raised and the signals remain off if the type of controller requested by the configuration does not match the controller type. Configurations are created for one specific type of controller (as specified by the 'Hardware' field on the IC4 Administration page) and will only run on that specified type of controller.

NOTE: If this fault is reported on an ST750ELV Controller, also check the communications between the CPU Card and the ST750ELV IO/PSU Module.

31 to 32	**FLF 31 to 32 – Not Currently Used**

Flag	Description

33 FLF 33 – ELV LSLS outputs faulty

SHUTDOWN

`LOUT FLF 33:N`

`FLF 33:1` - Over current detected (short circuit to return or earth?)
`FLF 33:2` - Background test failed (short circuit to adjacent output?)
`FLF 33:4` – Conflict configuration data consistency checks failed

Fault data contains one bit per LSLS output (four bytes per LSLS card)
`FLD 130` = LSLS #1 Outputs 1-8
`FLD 131` = LSLS #1 Outputs 9-16
`FLD 132` = LSLS #1 Outputs 17-24
`FLD 133` = LSLS #1 Outputs 25-32
`FLD 134` = LSLS #2 Outputs 1-8
…through to…
`FLD 153` = LSLS #6 Outputs 25-32.

```
                32....25         24....17         16.....9         8......1
LSLS#1: FLD 133:XXXXXXXX FLD 132:XXXXXXXX FLD 131:XXXXXXXX FLD 130:XXXXXXXX
LSLS#2: FLD 137:XXXXXXXX FLD 136:XXXXXXXX FLD 135:XXXXXXXX FLD 134:XXXXXXXX
LSLS#3: FLD 141:XXXXXXXX FLD 140:XXXXXXXX FLD 139:XXXXXXXX FLD 138:XXXXXXXX
LSLS#4: FLD 145:XXXXXXXX FLD 144:XXXXXXXX FLD 143:XXXXXXXX FLD 142:XXXXXXXX
LSLS#5: FLD 149:XXXXXXXX FLD 148:XXXXXXXX FLD 147:XXXXXXXX FLD 146:XXXXXXXX
LSLS#6: FLD 153:XXXXXXXX FLD 152:XXXXXXXX FLD 151:XXXXXXXX FLD 150:XXXXXXXX
```

In the System Log the fault data will be interpreted as shown in this example:
`LSLS1/32 (K/AMB)` – LSLS#1, output 32 (which is assigned to Phase K amber aspect) is faulty

The fault FLF 33:1 ‘over current detected’ may be caused by too many or incompatible signals being fitted (see the /SU/ document), a faulty signal, a short circuit to earth or a faulty LSLS Card.

The faults FLF 33:4 and FLF 1:255 (page 30) indicate an inconsistency in the conflict configuration data for the LSLS outputs identified in the fault data.

34 to 37 FLF 34 to 37 – Not Currently Used

Flag	Description

38 **FLF 38 – No Dim/Bright Changes in 24 hours**

SIGNALS REMAIN ON MANUAL RESET

`NDIM FLF 38:255`

No dim/bright changes were detected in a 24 hour period although dimming is configured, see KDP on page 65.

If either FLF38 (NDIM) or FLF39 (DIM+) are set, the controller will force the signals into the bright state. Both faults can be cleared by 'RFL=1', but will be re-reported if the fault is detected again.

---

39 **FLF 39 – Too Many Dim/Bright Changes**

SIGNALS REMAIN ON MANUAL RESET

`DIM+ FLF 39:255`

The number of dim/bright changes detected in a 24-hour period exceeds the configured limit, see KDL.

If either FLF38 (NDIM) or FLF39 (DIM+) are set, the controller will force the signals into the bright state. Both faults can be cleared by 'RFL=1', but will be re-reported if the fault is detected again.

---

40 to 41 **FLF 40 to 41 – Not Currently Used**

---

42 **FLF 42 – ELV LSLS card major internal fault**

SHUTDOWN

`LSMF FLF 42:255, FLD 15:00XXXXXX`

An LSLS card has confirmed a major internal fault and shut down. Fault data identifies the card; e.g. FLD 15:00000010 = Replace the second LSLS Card.

---

43 **FLF 43 – Communications lost with ELV LSLS or Plus+ CIC card**

SHUTDOWN

`SPB FLF 43:255, FLD 91:00XXXXXX` (ELV LSLS cards)
`SPB FLF 43:254, FLD 91:00XXXXXX` (Plus+ CIC cards)

Indicates loss of communications from LSLS/CIC cards during normal operation. Fault data identifies the card; e.g. FLD 91:00000010 = 2nd Card.

Flag	Description

44 FLF 44 – Lamp Switch Card fault (LV LSC)

SHUTDOWN

LSC FLF 44:N

The controller will not illuminate the signals but set this fault on power-up if a problem with the lamp switch cards is detected. Self-Test may also help diagnose any problems detected.

Note: LV Controllers only. For ELV Controllers, refer to LSLS faults.

FLF 44:1 – Faulty Lamp Switch Cards.
Basic problem with the lamp switch cards, e.g. first and third cards found but no second card.

FLF 44:2 – Four Phase Card In Wrong Position
The controller can only support one four-phase lamp switch card and it must be the only card fitted or the last card fitted after a number of eight-phase cards.

FLF 44:3 – Not Enough Cards Fitted
Too few cards are fitted to support this configuration, e.g. nine real phases are configured but only one eight phase card is fitted, or five real phases are configured but only one four phase card is fitted.

FLF 44:4 – Four Phase Card Required
The configuration requires a single four-phase lamp switch card but an eight-phase card has been detected.

45 to 48 FLF 45 to 48 – Not Currently Used

49 FLF 49 – RTC device failed

SIGNALS REMAIN ON MANUAL RESET

RTCH FLF 49:255

The controller has detected a fault with the real time clock device, i.e. its seconds register is not changing.

This fault will also set FLF7 and require the clock to be set again.

Flag	Description

50 FLF 50 – Power break exceeded clock support capability

SIGNALS REMAIN ON MANUAL RESET

```
BATT FLF 50:255
```

On power-up, the controller examines the RTC and will set this fault flag if it appears that the RTC has been reset because the length of the power break has exceeded the capabilities of backup power support provided by the Super-Caps and optional coin cell on the CPU PCB.

The fault may also be set the first time the CPU PCB is powered because the RTC will not have been set.

The fault FLF 7 will also be set – see page 40.

51 FLF 51 – SDE/SA Assessors configured, but inputs not allocated

SIGNALS OFF MANUAL RESET

```
SDEN FLF 51:255
```

A stand-alone pedestrian controller will report this fault on power-up and not illuminate the signals when the SDE/SA facility is not enabled correctly.

The controller will set this fault and keep the signals switched off if SDE/SA is configured (see ‘SDS’) but at least one stream has none of its SDE/SA assessors allocated to physical inputs (see ‘IOA’). This fault will therefore be raised when any default stand-alone pedestrian configuration is loaded since by default these configurations enable SDE/SA but have no SDE/SA assessors allocated to physical inputs.

- If SDE/SA is not required on any streams, enter ‘SDS=0’ to disable the facility.
- If SDE/SA is required on a stream, ensure that all the required assessors are allocated to physical inputs using the ‘IOA’ handset command.
- If SDE/SA is required on one stream but not on another, disable SDE/SA on stream ‘n’ using the handset command ‘SDD n=1’.

Also see section 6.7 SDE/SA Commands.

Flag	Description

52 FLF 52 – SDE/SA data changed – Reboot required

SIGNALS REMAIN ON MANUAL RESET

```
SDED FLF 52:N
```

On a stand-alone pedestrian controller, the SDE/SA facility can be configured using various handset commands (see section 6.7 starting on page 77). This fault is raised when any configuration data is changed.

This fault is also set when the I/O commands IOA or IPS are used on SDE/SA inputs configured on Serial I/O Cards or Intelligent Detector Backplanes.

While this fault is active, SDE/SA extensions will be forced active on all configured phases for safety.

This remains set until the Controller Application is restarted and the controller and I/O cards begin using the new data. This fault is then automatically cleared; RFL=1 does not need to be entered**.**

53 FLF 53 – Local Link PV1 fault

SIGNALS REMAIN ON MANUAL RESET

```
LINK FLF 53:255, FLD 80:XXXXXXXX
```

The PV1 input on the stand-alone stream identified in the fault data has either been active longer than the time specified by LKA or inactive longer than the time specified by LKI.

While this fault is active, the pedestrian phase on that stand-alone stream will be prevented from appearing and the cabinet alarm will be illuminated.

Flag	Description

54 FLF 54 – Red Lamp Monitor internal failure

RLM ACTIONS MANUAL RESET

```
LMUF FLF 54:N
```

The Lamp Monitor has detected an internal fault and has suspended monitoring. If red lamp monitoring is configured, second red lamp failures will be generated on all configured phases (see FLF22), extinguishing the signals or inhibit the pedestrian phases as required. The lamp monitor need only be reset (using 'KLR=1') to clear the fault, thus FLF 56 is also set.

The value of the fault flag identifies the type of internal failure detected. If multiple problems are detected, the sum of the values will be shown.

```
FLF 54:1
FLF 54:32
```

On start-up, the Lamp Monitor has failed to restore its working data, which includes the learnt lamp loads etc.

```
FLF 54:2
```

The Lamp Monitor has detected a corruption of its working data.

```
FLF 54:4
FLF 54:8
FLF 54:16
```

The Primary CPU detected that the Lamp Monitoring module has stopped.

55 FLF 55 – Lamp Fault(s) confirmed

SIGNALS REMAIN ON AUTOMATIC RESET

```
LAMP FLF 55:255, A/Red 49W
```

The lamp monitor has detected a lamp fault. Use the command 'KLD' to view the lamp faults (Load Dropped) in detail rather than FLD or FDS. In the above example, phase A red has lost 49 watts. See section 0 starting on page 128 for information about resolving lamp faults.

If the value is preceded by a plus symbol, e.g. A/Red+50W, then it indicates that an unexpected load increase has been confirmed.

Where a fault has been detected on sensors that cannot easily be interpreted as a phase and colour, the sensor and aspect numbers are shown. For example, "S33/A1 20W" indicates that a 20 watt drop in load has been confirmed on sensor 33 while aspect pattern 1 is illuminated. See section 9.2 on page 125 for more information on aspect numbers.

Flag	Description

56 FLF 56 – Full Lamp Monitor Reset required

SIGNALS REMAIN ON MANUAL RESET

```
LMUC FLF 56:255
```

The lamp monitor has detected a change to its configuration data and needs to be reset. Use the handset command KLR to reset the lamp monitor (which will automatically clear this fault) and refer to section 9.3.

Examples of the configuration data that if changed will trigger this fault are the KDP (page 65) and KLT (page 133) handset commands.

This fault flag is also set automatically when FLF 54 is set.

57 FLF 57 – Not Currently Used

58 FLF 58 – Not Currently Used

59 FLF 59 – Not Currently Used

60 FLF 60 – UTC Force Bit stuck active

SIGNALS REMAIN ON MANUAL RESET

```
UTCF FLF 60:255, UTC F3 AC200S
```

The controller has confirmed that a UTC Force Bit has been stuck active for more than the configured timeout period (UWD on page 105).

While the force bit remains active, UTC mode will be disabled (on all streams). The above example indicates that the UTC force bit for stage 3 was stuck active for more than 200 seconds.

When the Force Bit goes inactive, UTC mode will be allowed again. The FLF 60 fault flag remains set until manually cleared by RFL=1.

Important: When a MOVA unit is connected to the free-standing UTC interface this check should be manually disabled by entering the command UWD=0. If the check is not disabled, it will generate faults during periods of light traffic flow when MOVA legitimately holds the same stage for a long period. The check is automatically disabled when the internal MOVA mode or ‘Serial MOVA’ is used.

61 FLF 61 – Not Currently Used

Flag	Description

62 FLF 62 – Non-FLF fault present in Fault Table

```
!FLF FLF 62:255
```

Other faults are present in the Fault Table. The Fault Table can be viewed using the WIZ handset command or the web interface.

Example: When the UTMC-OTU Application confirms a fault, the FLF62 flag is set to ensure that legacy equipment scanning the controller's fault flags can still detect that there is an active fault in the ST950.

63 FLF 63 – Not Currently Used

5 MAINTENANCE AND MONITORING COMMANDS

The section details all the handset commands that may be used during maintenance of the controller, including commands used to monitor the functions of the controller.

5.1 Fault Commands

For more details on Controller Faults, refer to section 4 starting on page 26.

	DESCRIPTION AND REMARKS	

FFS	FFS <Fault Flag 0 to 63> : <Value 0 to 255>
	View the active fault flags using the **F**ault **F**lag **S**can, which only shows fault flags which are set, followed by a short abbreviation of the name of the fault to help identify it. Also displays the handset command which should be used to view the fault data (if not FDS) i.e.
	`FFS 12:255  DFM, see DSF`
	`FFS 55:255 LAMP, see KLD`
	This command is an improvement on the original FLF command (10.1).
		R

FDS	FDS <Fault Data 0 to 249> : <Value 00000000 to 11111111> View the fault data using the **F**ast **D**ata **S**can. Similar to FFS in that it only displays fault data bytes which are not all zeroes. This command is an improvement on the original FLD command (10.1).	R
RFL	RFL : <Value 0 to 2> Used to **R**eset the **F**ault **L**og using 'RFL=1'; see section 4.3 on page 26.	2
RBC	RBC : <Reboot Code Number> <Status Text> **R**emote Re**B**oot **C**ode. RBC:0 !Shutdown – Feature disabled; the controller is not shutdown. RBC:0 Watchdog – Feature disabled; watchdog fault detected. RBC:0 !RFL:2 – Feature disabled; reset fault log not yet requested. RBC:0 Ready – Enter RBC=11 to initiate a 'Remote Reboot'.	2

5.2 Facilities / Equipment Configured

	DESCRIPTION AND REMARKS	
IOB	IOB <Card Number 0 to 15>: <0=Not required, 1=Required> Indicates which **I/O** Cards (**B**oards) are required by the Controller Application. For each IOB *n*:1, the Controller Application will check that the card at address '*n*' is present and of the expected type. Must match the number required, i.e. 'IOB X:0' means I/O card with address 'X' will not be used by the Controller Application. If an I/O Card is used solely by another application within the ST950 and is not used the Controller Application, the IOB setting does not have to indicate that the card is fitted. Furthermore, if that I/O Card is not present in the IC4 configuration, setting the IOB flag for that address is likely to cause the Controller Application to report the card as faulty (because it does not match the type of card specified by IC4). To use an I/O card configured by the IC4 configuration that initially contained no required I/O lines, enter IOB Y=1 (where Y is the address of the card), power off the controller, fit the new I/O card, power on the controller. Check the LEDs on the I/O card illuminate correctly and no I/O card faults are present (FLF 13).	2
LED	LED : <Mode 0 (Off), 1 (On-Default) or 2 (Auto)> Controls the operation of the Mimic LEDs on the LSLS Card: 0 = Always Off; use LED=1 to turn the LEDs back on 1 = Always On; the default setting 2 = Auto; Mimic LEDs switch off when the cabinet door is closed* (* Assumes an optional door switch is fitted)	O

	DESCRIPTION AND REMARKS	
FAC	FAC <Facility Number 0 to 59> : <Binary> **FAC**ilities table where a non-zero value indicates that the configuration is requesting the specified facility: FAC 3:00000001 RTC load from UTC signal (TS2) FAC 4:00000001 Optional phase requests in manual mode FAC 5:00000001 Base time CLF facility requested FAC 7:00000001 Call/cancel facility requested FAC 9:00000001 Linked fixed time (LFT) mode configured FAC 10:00000001 Manual step-on mode requested FAC 13:00000001 U/D facility requested FAC 17:00000001 Red lamp monitoring configured FAC 18:00000001 'Download to Level 3' enabled (non UK only) FAC 20:00000001 Software Fail to flashing (fail to part-time facility) requested 00000010 Hardware Fail to flashing (HFF) requested FAC 23:00000001 Fixed time to current maximum's (FTCM) mode configured FAC 24:00000001 Ripple change facility requested FAC 25:00000001 SDE/SA has been requested FAC 26:00000010 ST750ELV controller required (also see FLF 30) FAC 29:00000001 Special Conditioning faults are no longer latched by the software FAC 31:00000001 MOVA Mode configured 00000010 Separate MOVA detector data for each configured Kernel FAC 32:00000001 Light Rail Transit (LRT) mode configured FAC 34:00000001 Plus+ Controller type FAC 35:00000001 DVI35 communications and features	R

5.3 IC4 Configuration Identity

	DESCRIPTION AND REMARKS	
CIC	CIC : <Text> **C**onfiguration **I**dentity **C**ode number. Normal response is the STS / 'EM' Number then the issue number. Note that this command shows the identity of the configuration running in the controller and thus does not show the identity of a new configuration loaded until it the controller has been initialised.	R
CID	CID : <firmware version> Firmware Type and Issue 'desired' by the IC4 configuration.	R

	DESCRIPTION AND REMARKS	
CRC	CRC : <Eight Digit Hexadecimal Number> Displays the configuration data's **CRC** or 'checksum' as shown on the Administration page of the IC4 print-out. As with CIC, this command shows the checksum of the configuration running in the controller. Note: This command displays the checksum of the original data from IC4; the value will not change when the controller timings are modified via the handset for example. The commands ENG 241/242 can be used to view the checksums of the data held within the controller's memory.	R

5.4 Firmware Identities

Tip! Remember that the web interface and Export Site Info (PI Dump) facilities display the inventory information for the whole controller, including firmware versions and hardware asset information. Always consider using those facilities in preference to these handset command mnemonics.

	DESCRIPTION AND REMARKS	
PIC	PIC : <Text> **P**rogram **I**dentity **C**ode number. Normal response is a 5-digit number to identify the part, followed by the issue number. Displays the firmware part number and issue for the complete ST950 software package (which includes the internal OTU and MOVA applications for example).	R
SIC	SIC : <Text> **S**econdary processor **I**dentity **C**ode number. Normal response is 'PB' followed by a 3-digit number to identify the part, followed by the issue number. Displays the firmware part number and issue for the PHP CPU (only used on the mains controller).	R
VFF	VFF : <firmware version> Firmware version in the Fail Flash CPU.	R
VIO	VIO <I/O Card 1-15> : <firmware version> Firmware version (part number and issue) in each serial I/O card and backplane (addresses 1 to 15)	R
VLS	VLS <LSLS Card 1-6> : <firmware version> Firmware version (part number and issue) in each LSLS card (addresses 1 to 6)	R
VPR	VPR : <firmware version> Firmware version in the Primary CPU.	R
VSE	VSE : <firmware version> Firmware version in the SEC CPU.	R

5.5 Lamp Supply Commands

	DESCRIPTION AND REMARKS	
KEV	KEV : <volts> **E**lectrical **V**olts displays the lamp supply voltage in volts. This reading can be calibrated. If the value displayed differs from the measured RMS voltage, enter the correct value, e.g. “KEV=230”.	3
MFQ	MFQ : <Hz> This displays the mains frequency in Hz.	R
KLV	KLV : <Lamp Supply Voltage Type (Value)> The configured **L**amp Supply **V**oltage Type. This command is described in more detail on page 132 in the lamp monitor section.	3
LBT	LBT : <45 to 255 volts> [Not ELV] **L**ow lamp supply **B**right **T**hreshold used to determine when the supply has dropped too low. The lamps are extinguished when the lamp supply drops below ‘LBT’ volts for ‘LSF’ mains cycles and the fault flag FLF17 is set after ‘LST’ seconds. FLF17 is detailed on page 44. The values shown by LBT, LBH, LDT and LDH are ignored on ELV controllers because these controllers use their own built-in ELV limits. **IMPORTANT:** The LBT and LDT thresholds should not be set lower than 100V on a 200-240V controller or 45V on a 100-120V controller because lamp monitoring will be suspended below these voltages.	3
LBH	LBH : <0 to 255 volts> [Not ELV] **L**ow lamp supply **B**right **H**ysteresis used to determine when the supply has been restored. The lamps automatically restart when the lamp supply has risen above ‘LBT+LBH’ volts for ‘LSN’ seconds.	3
LDT	LDT : <45 to 255 volts> [Not ELV] **L**ow lamp supply **D**im **T**hreshold is used for the same purpose as LBT, except that LDT is used when the lamp supply has been dimmed	3
LDH	LDH : <0 to 255 volts> [Not ELV] **L**ow lamp supply **D**im **H**ysteresis is used for the same purpose as LBH, except that LDH is used when the lamp supply has been dimmed.	3
LSF	LSF : <1 to 25 mains cycles, i.e. 20 to 500ms at 50Hz> **L**ow lamp supply **S**witch of**F** time specifies over how many mains cycles the controller confirms that the supply has actually dropped too low. **IMPORTANT:** This value is defaulted to four mains cycles (80mS) and should not be modified without first consulting Siemens.	3

	DESCRIPTION AND REMARKS	
LSN	LSN : <1 to 255 seconds> **L**ow lamp supply **S**witch o**N** time specifies over how many seconds the controller confirms that the supply has risen back above the threshold plus the hysteresis. Also see LST (below).	3
LST	LST : <0 to 255 seconds> **L**ow Lamp **S**upply Fault **T**ime specifies the delay before the fault flag FLF17 is set (detailed on page 44). The fault will be automatically cleared when the controller confirms that the supply has been restored. The default values for LSN and LST are four seconds. If the FLF17 fault flag is set on a normal power breaks, the LST value may be set too low. If LST is set to 255, the fault flag FLF17 is never set (not recommended). If the LST value is set the same or lower than the LSN value, time-stamped FLF17 events will be recorded in the System Log when a lamp supply dip causes the traffic signal sequence to restart. If the LST value is set higher than the LSN value, these FLF17 events may not be logged on a short supply dip. Regardless, 'stream restarted' events are always logged whatever the cause of the signal sequence restart.	3
RRT	RRT : <Idle (0), Requested (1), Running(2)> **R**equest **R**elay **T**est using '`RRT=1↵`' will initiate a test of the lamp supply relays. The test will only be performed if the signals are on and normally takes 2 minutes to complete (since the relays are checked once a minute), but may take longer if the controller has to retry a test. Note that a relay test is automatically requested every power-up and at 3am every night (adjustable with an 8DF file). '`RRT:2`' is displayed while the test is running (automatically or manually initiated), which returns to '`RRT:0`' when it is complete. The fault flag 'FLF 4' will be set and the lamps extinguished if a fault is detected, see page 37.	3

5.6 Dim/Bright Facility

	DESCRIPTION AND REMARKS	
KDP	KDP : <Dimming Present? (0, 1 or 2)> Is **D**imming **P**resent on this controller? Set to '0' if dimming is disabled, i.e. the signals are to remain bright. Set to '1' if dimming is required. The lamp monitor (if enabled) will need to learn the lamp loads in both dim and bright and will ensure that at least one dim/bright change occurs every 24 hours otherwise FLF 38 is set (see page 53). Set to '2' if dimming is required but no checking is required. Use this option when the solar cell sometimes does not operate due to bright street lighting or when the selected dim voltage is too close to the bright voltage for the controller to confirm the dim/bright change. **IMPORTANT:** Always reset the lamp monitor (KLR=1) after enabling or disabling dimming using this command.	2

	DESCRIPTION AND REMARKS	
DOV	DOV : <Override to Bright (1), No Override (0)> **D**im **Ov**erride forces the lamps to the bright state.	2
KDL	KDL : <0 to 255 changes> **D**imming **L**imit set the maximum number of dim/bright changes allowed in any 24-hour period. The lamp monitor will set the fault flag FLF 39 if it confirms more dim/bright changes than configured by this command.	2
KDB	KDB : <State 0, 1 or 2> **D**im/**B**right state shows the dim/bright state confirmed by the lamp monitor, where 0=no change yet, 1=dim, and 2=bright.	R
DLP	DLP : <State 15 – 40> **D**im **L**evel **P**ercentage command allows the user to set the Dim level on Plus+ Controllers. The range is limited from 15% up to 40%.	2

Also see sections 8.12 and 8.13 for the 'SO' input dimming type command 'DIT'.

5.7 Test Facilities

	DESCRIPTION AND REMARKS	
LMP	LMP <Phase A to F2> : <Colour 1 (red), 2 (amber) to 3 (green) or 0> Initiates the **L**a**MP** test for maintenance and fault-finding purposes only and will only function if the signals are initially switched off using the switch on the manual panel. For example, enter 'LMP A=1' to illuminate phase A red only. Once activated, press the SPACE key to test the next colour or next phase*. Press any other key to stop the test and extinguish the signal. The mnemonics LMC/LMH/LMS and LMP are two alternative means of initiating a 'lamp test'; use either LMS or LMP to initiate a test. ***WARNING*** **USE WITH EXTREME CARE. THE RISKS TO ROAD USERS AND PEDESTRIANS SHOULD BE ANALYSED AND APPROPRIATE PROTECTIVE MEASURE TAKEN, WHICH MAY INCLUDE SIGNAGE AND COVERING OF THE SIGNALS.**	3
LMC	LMC : <Colour 1 (red), 2 (amber) to 3 (green) or 0 (none)> **L**a**M**p test **C**olour. Selects the colour which will be illuminated during a lamp test using the LMS command.	3
LMH	LMH : <Phase A to F2> **L**a**M**p test p**H**ase. Selects the phase which will be illuminated during a lamp test using the LMS command.	3

* *From firmware 46059 issue 9 onwards*

	DESCRIPTION AND REMARKS	
LMS	LMS : <Duration 0 to 255 seconds> **L**a**M**p test **S**tart. Initiates lamp test, illuminating the phase and colour selected by LMH & LMC. The test stops after the specified number of seconds. A running test can be stopped early by writing the value to zero. The displayed value is the last test duration requested. Use LMT to see the remaining time. The mnemonics LMC/LMH/LMS and LMP are two alternative means of initiating a 'lamp test'; use either LMS or LMP to initiate a test. ***WARNING*** **USE WITH EXTREME CARE. THE RISKS TO ROAD USERS AND PEDESTRIANS SHOULD BE ANALYSED AND APPROPRIATE PROTECTIVE MEASURE TAKEN, WHICH MAY INCLUDE SIGNAGE AND COVERING OF THE SIGNALS.**	3
LMT	LMT : <Time remaining 0 to 255 seconds> **L**a**M**p test **T**ime remaining. A non-zero value indicates the lamp test initiated by LMS is active. The value displayed is the number of seconds of test time remaining.	R
PHD	PHD <Phase A to F2> : <Continuous demand (1) No demand (0)> Introduce an operator **Ph**ase **D**emand for the specified phase. The demand is inserted continuously until explicitly cleared, e.g. 'PHD A=0'.	2
PHE	PHE <Phase A to F2> : <Continuous extension (1) No extension (0)> Introduce an operator **Ph**ase green **E**xtension for the specified phase. The extension request is inserted continuously until explicitly cleared, e.g. 'PHE A=0'.	2
TCS	TCS **T**rip **C**heck **S**um – For Engineering Use Only ***WARNING*** **MUST NOT BE USED UNDER ANY CIRCUMSTANCES TO TEST EQUIPMENT WITH SIGNALS ON AND CONTROLLING TRAFFIC.**	3
TMA	TMA : <Access Code> **T**est **M**ode **A**ccess code. Enter 'TMA=252' to freeze the traffic signals to allow them to be single stepped for test purposes. Will return 'TMA:0' if the facility is not running. The facility can only be enabled if the signals are switched off using the Signals On/Off Switch on the Manual Panel. Also see TMC and TMT.	3
TMC	TMC : <Countdown> **T**est **M**ode **C**ountdown. Once the traffic signals have been frozen using TMA above, they can be requested to run for a number of seconds before freezing again. For example, entering 'TMC=10' will allow the traffic signals to run 10 seconds, and while they are running, the display will decrement, showing '9', '8', etc., until it returns to '0'. While either 'TMC' or 'TMT' is being displayed, pressing the space bar will allow the traffic signals to run for one second. Therefore, pressing it three times in quick succession and the traffic signals will run for three seconds and then freeze again.	2

	DESCRIPTION AND REMARKS	
TMT	TMT : <Timer Value> **T**est **M**ode **T**imer automatically runs a 'stopwatch' timer showing exactly how long the traffic signals have been allowed to run. While the traffic signals are actually running and are not frozen this value increments. To reset the timer, simply enter 'TMT=0'. While either 'TMC' or 'TMT' is being displayed, pressing the space bar will allow the traffic signals to run for one second. For example, pressing it three times in quick succession and the traffic signals will run for three seconds and then freeze again.	2
TSC	TSC **T**rip **S**erial **C**omms – For Engineering Use Only ***WARNING*** **MUST NOT BE USED UNDER ANY CIRCUMSTANCES TO TEST EQUIPMENT WITH SIGNALS ON AND CONTROLLING TRAFFIC.**	3
TSE	TSE **T**rip **S**oft **E**rror – For Engineering Use Only TSE=1 - Triggers an internal software error TSE=2 - Triggers a stack fault TSE=3 - Triggers a high stack usage warning TSE=4 - Triggers a stack overflow error ***WARNING*** **CAUSES IMMEDIATE SHUTDOWN AND THEREFORE MUST NOT BE USED UNDER ANY CIRCUMSTANCES TO TEST EQUIPMENT WITH SIGNALS ON AND CONTROLLING TRAFFIC.**	3
TWD	TWD : <Trip Request> **T**rip **W**atch**D**og test facility: 'TWD=1' stops the Primary CPU software kicking the hardware watchdog to test that it then times out triggering controller shutdown. 'TWD=2' stops the Primary CPU software incrementing the software watchdog to the Secondary CPU software to test that the Secondary CPU can trigger controller shutdown. 'TWD=3' stops the Primary CPU responding to the Application CPU to test how the two CPU react – For Engineering Use Only. 'TWD=4' simulates a fault within the Primary CPU software – For Engineering Use Only. ***WARNING*** **CAUSES IMMEDIATE SHUTDOWN AND THEREFORE MUST NOT BE USED UNDER ANY CIRCUMSTANCES TO TEST EQUIPMENT WITH SIGNALS ON AND CONTROLLING TRAFFIC.**	3
ZZF	ZZF Handset Debug Flags – For Engineering Use Only ***WARNING*** **MUST NOT BE USED UNDER ANY CIRCUMSTANCES TO TEST EQUIPMENT WITH SIGNALS ON AND CONTROLLING TRAFFIC.**	2

5.8 Status Commands

	DESCRIPTION AND REMARKS	
STS	STS <Stream 0 to 7> : <Mode> <Stage> <Status> **St**atus of the **S**tream displays information such as the current mode and stage and whether minimum or maximum green timers are running. The '**mode**' information will be one of the following: `FIXTIME`.. Fixed Time (or Linked Fixed Time) mode is running `FT-SETx`.. Fixed time to current (i.e. maxset 'x') maximums (FTCM) `VA-SETx`.. VA mode is running, using alternate maxset 'x' `CLFp,g`.... CLF mode is running CLF plan 'p' and group 'g' `MANUAL`.... Manual mode is running `HURRYx`.... Hurry call mode is running and unit 'x' is active `UTC-Fx`.... UTC mode is running and stage 'x' is being forced `PARTIME`.. Part-time mode is running `STARTUP`.. Start-up mode is running `FVP-MEX`.. Fixed Vehicle Period mode running 'MEX' timings `STEP-ON`.. Manual step-on mode is running `EM/VEHx`.. Emergency vehicle mode is running and unit 'x' is active `PRIVEHx`.. Priority vehicle mode is running and unit 'x' is active `VAP-MAX`.. VA mode running 'MAX' timings (stand-alone ped. stream) `MOVA-Fx`.. MOVA mode is running and stage 'x' is being forced `LRTx` ..... LRT mode running and unit 'x' is active `MODEx` ..... Mode 'x' is running; e.g. failure mode 0 Note that if more than one unit is active '+' is displayed instead of the unit number, e.g. '`HURRY+`'. For stand-alone streams, the '`MAX`'/'`MEX`' indications will be: '`PV `' – when UTC PV (or its pedestrian window) is active, '`PV1`' – when local link PV1 (or its pedestrian window) is active, '`CLF`' – when IFN influences 8 and 9 are active. The '**stage**' information shows the current stage, e.g. '`S2`', or the previous and next stages during a stage to stage mode, e.g. '`S2-3`'. The '**status**' information can show one of the following: '`MIN`' if any minimum green timers are active '`FVP`' if the fixed vehicle period is active during FVP mode '`MAX`' if any maximum green timers are active '`A/R`' while an all-red hold is active '`RLM`' while any red lamp monitoring delay is active '`DFZ`' while any phase delay is active '`PBT`' while any minimum clearance period is active '`CMX`' while any extendable clearance period is active '`CDY`' while any clearance delay period is active '`CRD`' while any clearance red period is active '`PAR`' while any pedestrian all-red period is active '`IGD`' while any Intergreen Delay period is active '`SDE`' if any speed clearance requests have been actioned (see SCI/SPI)	R

	DESCRIPTION AND REMARKS	
SPH	SPH <Phase A to F2> : <Status> **S**tatus of a **Ph**ase displays information such as whether the phase is demanded or whether its minimum green timer is running. If the display width has been reduced to 14 characters (see page 21), eight binary bits are displayed. If the display width is still set to at least 20 characters wide, instead of the binary information, text is displayed when the bit would have been set to '1', otherwise '---' is displayed in its place: `SPH A:MIN EXT+ MAX DLY` (when at right of way) `SPH A:DEM RLMI SEQ DLY` (when not at right of way) This format also shows one extra piece of information '`RLMI`' which shows when red lamp monitoring has inhibited the phase. Each bit or abbreviation indicates the phase is… `00000001 - DEM` - Phase is being demanded* `00000010 - EXT+` - Phase extension requested (excludes SDE/SA) `00000100 - MIN` - Timing minimum green period `00001000 - EXT` - Phase extension being timed off `00010000 - MAX` - Timing maximum green period `00100000 - DLY` - Timing leading or lagging phase delay `01000000 - SEQ` - Timing lamp sequence set, e.g. red/amber time `10000000 -` - Not currently used * Note that if the controller is running any mode other than VA, a demand may be inserted by that mode (e.g. fixed time to current maximums) or the street demand may require further processing by the mode before being accepted (e.g. CLF mode).	R
FZC	FZC <Phase A to F2> : <Colour> Current phase (**FZ**) **C**olour as an RAG string i.e. "R__" indicates phase is at red, "__G" indicates phase is at green, "RA_" indicates phase is at red/amber. Displays '___' if the signals are switched off.	R
FZD	FZD < Phase A to F2> : <0 or 1> Phase (**FZ**) **D**emand. 1=demand registered for the phase.	R
FZE	FZE < Phase A to F2> : <0 or 1> Phase (**FZ**) **E**xtension. 1=extension time active for the phase.	R
FZI	FZI <Phase A to F2> : <0 or 1> Phase (**FZ**) **I**nhibit. 1=RLM phase inhibit active for the phase.	R
FZM	FZM <Phase A to F2> : <Timer Value> Phase (**FZ**) **M**inimum green timer value in seconds. Counts down from phase minimum green time to 0.	R

	DESCRIPTION AND REMARKS	
FZQ	FZQ <Phase A to F2> : <Sequence Timer Status> Phase (**FZ**) se**Q**uence timer status may display one of the following: • "PBT", "CMX", "CDY", "CDY", "PAR" for Pedestrian periods. • "RLM" for RLM delay period (RLT) • "SEQ" for 'sequence' timer is active, Sequence timer runs whenever a phase is executing its amber leaving or red / amber periods for example. • "A/R" if an All Red hold is active on the stream. • "-" if none of the above are active.	R
FZX	FZX <Phase A to F2> : <Timer Value> Phase (**FZ**) ma**X**imum green timer value in seconds. Counts down from phase maximum green time to 0.	R
FZY	FZY <Phase A to F2> : <Timer Value> Phase (**FZ**) dela**Y** timer value in seconds. Counts down from phase delay time to 0.	R
TMR	TMR <Group> <Instance> : Timer Value> Time left on the specified timer. For engineering use only.	R

6 INPUT AND OUTPUT

6.1 I/O Layout

The traffic controller firmware can use up to 31 I/O ports (numbered 0 to 30) giving 248 I/O lines (numbered 0 to 247), although these numbers may be limited by the controller type.

Each I/O port normally contains 8 input lines (for detectors and pushbuttons, etc.) or 8 output lines (for UTC reply bits, etc.), although there are only 4 outputs on the 24 Input / 4 Output variant of the Serial I/O Card. The I/O card number is set by a rotary switch on each card.

Always refer to the works specification / IC4 printout for the I/O used by a particular installation.

6.2 Configuring the Standalone Pedestrian Controller

The signals of the stand-alone pedestrian controller should not be switched on until all of the appropriate facilities have been configured (or disabled) using the handset as described in configuration's special instructions. The I/O is no exception.

The I/O will be allocated via the Configurator, as normal for the controller, however these allocations will be to the 'logical' I/O lines. The Configurator may initially de-allocate several less frequently used inputs and outputs. If these 'logical' I/O lines, i.e. functions, are required, they must be allocated to physical I/O lines.

Logical I/O lines initially enabled can be de-allocated if not required to free up their physical I/O lines.

For example, if one of the configured vehicle detectors, pushbuttons, kerbside or on-crossing detectors is not required, e.g. a kerbside detector on input 12, that input may be de-allocated by setting 'IOA 12=255'. This frees up input 12 so another logical input may use it, e.g. an on-crossing detector on I/O line 48 may be moved to this physical I/O line using 'IOA 48=12'.

In the above example, the commands to re-arrange the I/O using IOA and review the changes using IOR would be:

IOA12=255↵	`IOA 12 BKBS1:255`
IOA48=12↵	`IOA 48 BONC3:12`
IOR12↵	`IOR 12:48 BONC3`
IOR48↵	`IOR 48:NONE`

Tip! After using the IOA command to re-arrange the I/O, always use the IOR command to review the I/O allocations. Use IOR to check that each physical I/O line has been assigned the required logical I/O line (i.e. the required logical function) or that 'NONE' is displayed if the physical I/O line is not used.

Note that almost all I/O commands access the logical I/O lines. Only IOP, IOR and CUD access the physical I/O lines.

6.3 Basic I/O Commands

Note: The firmware will display the function of each I/O line, i.e. the mnemonic configured on IC4 after the I/O line number on many handset commands. For example, if 'AX' is the 'name' assigned to I/O line 0, '`DET 0 AX:2`' would be displayed.

	DESCRIPTION AND REMARKS	
DET	DET <Logical I/O Line 0 to 247> <Function>: <Force Request 0 to 2, 99> Force the **DET**ector's state to either 'Not Operated' (0), 'Operated' (1) or 'Normal Operation' (2). Can also be used to force the states of output lines as well as the state of detector inputs. Setting any I/O line to 99, e.g. 'DET 0=99', returns that I/O line and all the others back to normal operation, i.e. to '2'. Note that DFM is automatically suspended to avoid it timing out while a detector is being forced inactive (0) or active (1) by DET.	2
IOA	IOA <Logical I/O Line 0 to 247> <Function> : <Physical I/O Line 0 to 247, 254, 255> **I/O** Line **A**llocation. Displays the function and physical mapping of each logical I/O line on the controller. The function is displayed as the mnemonic used on the Configurator (read only). The physical I/O line number can be changed to 'move' the I/O line (0-247) or to disable it using 255 (input forced inactive) or 254 (input forced active).	3
IOC	IOC <Logical I/O Line 0 to 247> : <Count 0 to 65535> **I/O** Line Positive Transitions **C**ount. Displays a count of positive transitions for each logical I/O line on the controller. All the counts are cleared to 0 every 15 minutes (or 10 minutes prior to 46059 v24).	R
IOD	IOD <Logical I/O Line 0 to 247> : <Card Address 0 to 15> **I/O** Line Card A**D**dress. Displays the card address of each logical I/O line on the controller.	R
IOE	IOE <Logical I/O Line 0 to 247> : <Position 0 to N> **I/O** Lin**E** Number. Displays the I/O line number on the I/O card of each logical I/O line on the controller.	R
IOF	IOF <Logical I/O Line 0 to 247> : <Card Faulty (1) Not Faulty (0)> **I/O** Line **F**ault. Indicates if the I/O line is on a faulty I/O card.	R
IOI	IOI <Logical I/O Line 0 to 247> : <Output (1) Input (0)> **I/O** Line **D**irection. Displays the I/O line direction of each logical I/O line on the controller.	R
ION	ION <Logical I/O Line 0 to 247> : <Name> **I/O** Line **N**ame. Displays the name of each logical I/O line on the controller.	R

	DESCRIPTION AND REMARKS	
IOR	IOR <Physical I/O Line 0 to 247> : <Logical I/O Line 0 to 247> <Function> **I**/**O** Line **R**eview. Displays the function and logical mapping of each physical I/O line on the controller. The function is displayed as the mnemonic used on the Configurator. Where several functions, i.e. logical I/O lines, have been mapped to the same physical input I/O line, these are displayed in order.	R

IOP	IOP <I/O Physical Port Number 0 to 30> : <Binary>
	Displays the **I**/**O** **P**hysical port states as the inputs enter the controller before any processing (except U/D) is performed, or as the outputs leave the controller.
	Inputs: 0=Open-Circuit; 1=Closed-Circuit Outputs: 0=De-energised; 1=Energised
	Each I/O port displays the information for 8 I/O lines, with the first (lowest I/O line number) input appearing on the right, e.g. if the input lines 2, 3, 4 and 7 were closed-circuit, the following would be displayed for I/O port 0.
	`IOP 0:10011100`
	`7......0`
	Note that detector inputs can be simulated while IOP is viewing an input port using the keys '0' to '7', see section 3.8 on page 20.
		R

IOL	IOL <I/O Logical Port Number 0 to 30> : <Binary> **I**/**O** **L**ogical Port displays the state of the 8 lines on each logical I/O port. It shows the state of the input after any IOA mapping, IPS inversion or forcing of the input has been applied, so '1' indicates input active. Note: Where the I/O has been re-arranged using IOA, IOL shows the I/O lines in their original IC4 positions.	R
IOV	IOV <Logical I/O Line 0 to 247> : <0 or 1> **I**/**O** Line **V**alue. Displays the I/O line bit value of each logical I/O line on the controller.	R
IOY	IOY <Logical I/O Line 0 to 247> : < Physical I/O Line 0 to 247> **I**/**O** Line Ph**Y**sical Line Number. Displays the physical I/O line number of each logical I/O line on the controller.	R
IPS	IPS <Logical I/O Line 0 to 247> <Function>: <(0 or 1; 1=Inverted)> **I**/O **P**in **S**ense indicates that the controller should invert the specified I/O line. Inputs are closed-circuit for detect by default; set IPS to '1' for open-circuit for detect. Logic '1' on an output energises the relay output by default; set IPS to '1' to invert this.	2
IPX	IPX <I/O Line Number 0 to 247> : <0.0 to 31.8 seconds> Detectors that extend the phase green period, on-crossing detector inputs and pushbutton, cycle detector and kerbside detector inputs can all be assigned individual extension times using IPX, see sections… 8.2 'Pedestrian Clearance Period' on page 94. 8.10 'VA Operation Timings' on page 102. 8.3 'Pedestrian and Cycle Crossing Demands' on page 96.	3
XDX	XDX <Plan 1 to 32> <DVI35 Detectors 1 to 22> : <0.0 to 25.5 seconds> E**x**tra **D**etector E**x**tensions. For DVI35 Configurations only. For each input declared as a DVI35 Detector in the IC4 Configuration, XDX defines the input extension time for each DVI35 Plan (1-32). Values are in 100ms steps.	2

6.4 Detector Fault Monitoring (DFM) Commands

	DESCRIPTION AND REMARKS	
DSF	DSF < I/O Line Number 0 to 247> : <0=Failed Inactive, 1=Failed Active> A **D**etector's **S**tate on **F**ailure. Indicates whether an input has failed DFM stuck inactive or active. Auto-scans to only show the failed I/O lines. Also displays the name of the I/O line assigned in IC4. Also see FFS 12:255 on page 60.	R
ADF	ADF : <Request> **A**ccept **D**etector **F**aults by entering 'ADF=1' and extinguish cabinet alarm lamp thereby permitting indication of any further detector faults. To re-establish fault monitoring for detectors accepted as faulty and to re-illuminate the cabinet alarm, the DFM facility should be reset, either by using the RDF command (see below) or by simply entering RFL=1. The IDA command or ENG122 can be used to view accepted DFM faults.	2
DFA	DFA <I/O Line Number 0 to 247> : <Action Code 0 to 2> **D**etector **F**ault **A**ction – whether the detector's state should be forced when the detector is reported as faulty by DFM or the I/O Card fails (see FLF 13). 0 – override to inactive 1 – override to active 2 – use current input state. Note that on kerbside inputs, if kerbside testing is configured, the input is forced active regardless of the DFA setting.	2
DFS	DFS <I/O Line Number 0 to 247> : <Suppress Monitoring (1) > **DF**M **S**uppress disables monitoring on the specified detector.	2
DGP	DGP <I/O Line Number 0 to 247> : <DFM Group 0 to 7, 255> **D**FM **G**rou**P** for the specified detector or 255 if not monitored.	2
DSA	DSA <DFM Group 0 to 7> <DFM Alt. Set 0 to 3> : <Active Fail Time> **D**FM **S**et **A**ctive times for the specified DFM group (see DGP above) and timeset in the range 0 to 254 minutes, or disables monitoring of the active state by setting the time to 255. DFM Alternative Set 0 = Normal DFM time set DFM Alternative Set 1 = DFM Alternative time set B (ALTDFMB) DFM Alternative Set 2 = DFM Alternative time set C (ALTDFMC) DFM Alternative Set 3 = DFM Alternative time set D (ALTDFMD)	2

	DESCRIPTION AND REMARKS	
DSI	DSI <DFM Group 0 to 7> <DFM Alt. Set 0 to 3> : <Inactive Fail Time> **D**FM **S**et **I**nactive times for the specified DFM group and timeset in the range 0 to 254 hours, or disables monitoring of the inactive state by setting the time to 255.	2
DTO	DTO : <Request Time Override (1) > **D**FM **T**imes **O**verride sets all the DFM times to 1 minute for test purposes while the command is set to '1'. Note that events from DFM faults confirmed while DTO is set to '1' are inhibited from appearing in the time-stamped log.	2
IDA	IDA <I/O Line Number 0 to 247> : <Accepted (1), Not accepted (0)> **I**ndicates if a **D**FM fault on an I/O line is **A**ccepted by the ADF handset command.	R
PBG	PBG <DFM Group 0 to 7> : <Used By Push Buttons (1)> **P**ush **B**utton DFM **G**roups, i.e. which DFM groups are used to monitor push-buttons (1) and which are used to monitor vehicle detectors (0). Currently this information is only used by the London IMU.	2
RDF	RDF : <Request DFM Reset (1) > **R**eset **D**etector **F**aults so that detectors which have changed state since the fault was reported are no longer forced (see DFA) and no longer illuminate the cabinet alarm. No other fault flags are reset. RDF=1 resets the DFM fault flag FLF12 and extinguishes the System Error LED (assuming no faults remain). Note: RFL=1 also resets detector faults.	2

6.5 Call Cancel

	DESCRIPTION AND REMARKS	
DCL	DCL <Unit Number 0 to 7> : <0 to 255 seconds> **D**etector **C**all/cancel cal**L** period.	2
DCN	DCN <Unit Number 0 to 7> : <0 to 255 seconds> **D**etector **C**all/cancel ca**N**cel period.	2

6.6 U/D Commands

	DESCRIPTION AND REMARKS	
CUD	CUD <U/D Unit Number 0 to 7> : <Physical I/O Line Number 0 to 247, or 255> **C**onfigures the **U**/**D** unit to pre-process the specified I/O line (the 'A' loop) using the uni-direction algorithm, so only vehicles travelling in the correct direction are detected. In order to determine direction, a second detector (the 'U' loop) is required and this should be connected to the very next I/O line number. Note that IOP and IOL show the processed state of the 'A' loop, i.e. if the 'U' loop is activated first, the 'A' loop will remain inactive as seen by IOP, even if the input to the controller is actually activated.	2
UDT	UDT <U/D Unit Number 0 to 7> : <U/D Time-out 0 to 254 or 255> Specifies the **U**/**D** **T**ime-out value in units of 10 seconds. If either loop remains active for longer than this time, the 'A' loop is forced active so that the controller sees a demand. Setting the time to 255 disables the time-out option.	2

6.7 SDE/SA Commands

	DESCRIPTION AND REMARKS	
SAT	SAT <Assessor Number 0 to 15> : <Value 1 to 3> (<Phase>,<Type>) **S**DE **A**ssessor **T**ype can be used to display and alter (stand-alone pedestrian controllers only) the type of each SDE assessor, where: 1 = Double SDE Assessor ('Doub') 2 = Triple Inner Assessor ('Tinn') 3 = Triple Outer Assessor ('Tout') If SA is configured using SDS, '4' will be displayed, but if neither SDE nor SA is configured, '0' will be displayed. After the value, the handset will also display the (first) phase associated with that assessor and the type as text, e.g. '`SAT 0:1 (A,Doub)`'. If one or more SDE/SA assessors in a stand-alone pedestrian controller default configuration are not required, their inputs can be de-allocated using the IOA handset command like any other inputs (see page 72). If no SDE/SA assessors are required, SDE/SA should also be disabled using SDS=0 (see above). (This command replaces the T400 Pelican command SDT)	3

	DESCRIPTION AND REMARKS	
SCI	SCI <Index 0 or 3> : <Binary> **S**peed **C**learance extending **I**ntergreen where each binary bit indicates that the particular phase has a clearance request active during the current stage to stage movement. `SCI 0:HGFEDCBA` – Phases A to H `SCI 1:PONMLKJI` – Phases I to P `SCI 2:XWVUTSRQ` – Phases Q to X `SCI 3:FEDCBAZY` – Phases Y and Z, and A2 to F2 This command applies to intersection streams only. No indication is shown on standalone pedestrian streams where PAR all red timings are applied between the vehicle phase amber leaving period and the pedestrian phase green.	R
SCR	SCR <Index 0 or 3> : <Binary> **S**peed **C**learance extending intergreen **R**equest active where each binary bit indicates that the particular phase has a clearance request active. The display format is similar to SCI above. The SPR command can be used to view the clearance extending intergreen request status for an individual phase.	R
SCT	SCT <Phase A to F2> : <0 to 50 seconds> **S**peed **C**learance extending intergreen **T**ime for the specified intersection vehicle phase. **NOTE:** On stand-alone pedestrian streams it is a UK requirement that, the vehicle to pedestrian all-red period is fixed at three seconds if SDE/SA is configured so the SCT value is ignored.	3
SDD	SDD <Stream 0 to 7> : <1 to disable SDE/SA on this stream> **SD**E/SA **D**isabled on the specified stream. Use this command on a stand-alone pedestrian controller to disable SDE/SA on individual streams when SDE/SA is required on others. Also see FLF 51 (SDEN) on page 55.	3
SDS	SDS : <Value 0 to 2> - <‘None’/‘SA’/‘SDE’> <‘INT’> **SD**E **S**elect displays the selected type of high-speed vehicle detection: 0 = None, SDE/SA disabled. 1 = SA, Speed Assessment configured. 2 = SDE, Speed Discrimination configured (also see SAT). Following the value 0 to 2, the handset will display as text the type of high speed vehicle detection configured, if any, and a read only indication that SDE/SA is provided internally (not externally by a peripheral SDE/SA card). Use this command on a stand-alone pedestrian controller to enable or disable the facility as required.	3

	DESCRIPTION AND REMARKS	
SEA	SEA <Index 0 or 3> : <Binary> **S**peed green **E**xtension timers **A**ctive. Each binary bit indicates that the SDE/SA green extension timer is activated for that particular phase. The display format is similar to SCI above. The SPT and SPX commands can be used to view the green extension status for an individual phase and assessor respectively.	R
SPA	SPA <Assessor Number 0 to 15> : <Count 0 to 65535> **S**DE Assessor **P**ositive transitions on the **A** loop. The count is cleared every 15 minutes (or 10 minutes prior to 46059 v24).	R
SPB	SPB <Assessor Number 0 to 15> : <Count 0 to 65535> **S**DE Assessor **P**ositive transitions on the **B** loop. The count is cleared every 15 minutes (or 10 minutes prior to 46059 v24).	R
SPE	SPE <Assessor Number 0 to 15> : <Loops> <Ext> <Speed (mph & kph)> Displays the loop activations and the calculated Speed in both miles per hour and kilometres per hour for the requested SDE/SA assessor. It will also display 'E' if and when this assessor is generating an extension. The loop activations will display: --- if neither loop is occupied, o-- when only the first loop (the 'a' loop) is occupied, -o- when both loops are occupied, and --o when only the second loop (the 'b' loop) is occupied, --- when both loops are unoccupied again. This command allows internal SDE/SA to be commissioned. If SDE/SA is not configured or it has been disabled by command SDS, this command will display 'SPE n:Disabled'.	R
SPI	SPI <Phase A to F2> : <Clearance Request (1), No Request (0)> **SP**eed Clearance extending **I**ntergreen. A '1' indicates that the particular phase has a clearance request active during the current stage to stage movement. Same data as the SCI command, but for single phase instead of a group of eight.	R
SPK	SPK <Assessor Number 0 to 15> : <Speed 0 to 255 (kph)> Vehicle **SP**eed in **K**ph. Displays the calculated Speed in kilometres per hour for the requested SDE/SA assessor.	R
SPM	SPM <Assessor Number 0 to 15> : <Speed 0 to 255 (mph)> Vehicle **SP**eed in **M**ph. Displays the calculated Speed in miles per hour for the requested SDE/SA assessor.	R

	DESCRIPTION AND REMARKS	
SPR	SPR <Phase A to F2> : <Request (1), None (0)> **SP**eed Clearance extending intergreen **R**equest active. A '1' indicates that the particular phase has a clearance request active. Same data as SCR command, but for single phase instead of a group.	R
SPT	SPT <Phase A to F2> : <Timer Active (1), Timer Not Active (0)> **SP**eed green ex**T**ension timers active. A '1' indicates that the SDE/SA green extension timer is activated for that particular phase. Same data as SEA command, but for single phase instead of a group.	R
SPX	SPX <Assessor Number 0 to 15> : <Request> **SP**eed green e**X**tension: Displays 'E' if and when this assessor is generating a green extension. If SDE/SA is not configured or it has been disabled by command SDS, this command will display 'SPX n:Disabled'.	R

7 MASTER TIME CLOCK / CABLELESS LINKING COMMANDS

7.1 Setting the Real Time Clock

To synchronise a controller to the rest of a mains synchronised system, use the following procedure.

IMPORTANT: If the controller time is to be synchronised to a GPS Clock or network time source (using NTP) and not mains synchronised, use the web interface to set up the clock system rather than the TOD handset command. Refer to the controller User Guide for more information.

Synchronising a controller within a mains synchronised system should not be attempted during hours of peak electricity supply usage (0700 hrs to 0900 hrs and 1630 hrs to 1900 hrs).

1) Go to the nearest controller that is already set to the correct time. From this controller accurately set a watch (preferably a digital watch).
2) Then proceed to the controller to be set.
3) Ensure the controller to be set has mains frequency as its synchronising source (handset command CTS = 0). Then set the time accurately from the watch using the TOD command.
4) Return to first controller and re-check watch time against it. If there is significant drift, repeat steps 1 to 3 again.
5) If a number of controllers are to be set, always return to the original controller in between going to each controller to be set to prevent any cumulative error or use the mechanism described in section 7.2.

7.2 Setting a Number of Real Time Clocks

This procedure details how to set-up a small number of controllers to the same mains synchronised time. This is particularly important if the controllers use the CLF (cableless link facility).

To eliminate time deviations between controllers due to mains' frequency drift occurring during the synchronisation of multiple controller systems, all controllers in the system must be synchronised to a mains frequency reference source at an identical time. This time must be at a point in the future which will allow the real time clocks for all the controllers to have been set up.

To achieve this use the following procedure on each controller:

1) Set up the time at which the changeover from crystal to mains frequency reference source is to occur. This time must be set far enough ahead to allow the real time in all the controllers to be set in the system.

   Use the handset commands:
   MST 0 = day required (0=Saturday to 6=Friday)
   MST 1 = hours required
   MST 2 = minutes required

MST 3 = seconds required

2) Now set the master time clock reference source to crystal with changeover to mains at time set by MST command using the handset command CTS = 1. Check that after four seconds, it remains at 1.

3) Now set up the clock using TOD as accurately as possible with a digital watch.

4) This procedure should be repeated on all controllers in the system, setting up their clocks against the digital watch and ensuring that the changeover time from crystal to mains reference source as set up in step 1 are identical.

Ensure that all controller real time clocks have been set up before the changeover time is reached.

7.3 Real Time Clock Commands

	DESCRIPTION AND REMARKS	
TOD	TOD : <Time and/or Date> **T**ime **O**f **D**ay command can be used to view or set the clock. When viewing the time of day using the default display width of 20 characters or wider (see page 21), the display shows the date, time and day of the week all on one line. If the display width has been reduced to 14 characters, the '+' key can be used to view the date and then the day of the week. To set the mains synchronised clock, simply type '=' and the required date or time with no separators, e.g. '`=15APR21↵`' and '`=1135↵`'. The error '`TOD=*I`' will be displayed if the controller clock is configured to follow NTP or GPS for example.	2
CTS	CTS : <Timing Source 0 to 2> **C**lock **T**iming **S**ource set to (0) Mains or (2) Crystal Synchronisation. Alternatively, the clock can be initially set to crystal synchronisation and then switch over to mains' synchronisation when the time specified by MST is reached (1). See section 7.2 on page 81 for more information.	2
MST	MST 0 : <0 (Sat) to 6 (Fri)> MST 1 : <0 to 23 hours> MST 2 : <0 to 59 minutes> MST 3 : <0 to 59 seconds> **M**ains **S**ynchronisation **T**ime, i.e. the time at which this and the other controllers in the area should switch from crystal synchronisation (CTS:1) to mains synchronisation (CTS:0) so that they are all running the same time. See section 7.2 on page 81 for more information.	2

	DESCRIPTION AND REMARKS	
PFT	PFT 0 : <0 to 30 days> PFT 1 : <0 to 23 hours> PFT 2 : <0 to 59 minutes> **P**ower **F**ail **T**ime – if the controller is powered off for longer than this time, on power restoration fault flag FLF7 is set and the CLF and timetable facilities are disabled until the time is set again.	2

7.4 Timetable Commands

	DESCRIPTION AND REMARKS	
SWS	SWS <Time-switch Event 0 to 31> : <Active (1) or Inactive (0)> Time-**SW**itch **S**ettings displays the state of each time-switch event, either active or inactive. Can also be used to override a time-switch event until the next timetable event (or CCP is used).	2
TDY	TDY <Day Code 0 to 15> : <Text Description> **T**imetable **D**a**Y** codes displays the configured codes as follows: '`Sun`', '`Mon`'… if the day code just selects a single day. '`XSu`', '`XMo`'… 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 any of those above, the display is of the form '`MTWTFSS`', e.g. if only Monday, Wednesday and Friday are selected, '`M-W-F-`' is displayed.	R
TTB	TTB <Entry 0 to 63> : <Day Code> <Time> <Operation> This **T**ime**T**a**B**le command displays and modifies the same time-switch table as TSW, but on a wide screen will display the whole entry on one line. For example, if entry 0 started plan 0 at 8am all week the display would be '`TTB 0:7(WEK) 08:00:00 1 0`'. Using this command it is possible to change the day code, the whole time or the two operation codes in one command, i.e. TTB N = <Day Code>↵, or TTB N = <Hours> <Minutes> <Seconds>↵, or TTB N = <Operation Code> <Additional Operation Code Parameter>↵	2
TTD	TTD < Entry 0 to 63> <Index 0 or 1> : <Date DDMMMYY> or <Day Code 0 to 99> The **T**ime**T**able Special **D**ays same data as TSD except date and day code fields are accessed separately i.e. TTD n 0 accesses the date field and TTD n 1 accesses the day code field for table entry "n".	2

	DESCRIPTION AND REMARKS	
TSW	TSW <Entry 0 to 63> <Second Index 0 to 5> : <Value 0 to 255> **T**ime-**SW**itch 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 below. If any of the items are out of range, the controller ignores the whole timetable entry. Note: If no time-switch events are specified for the current day, the last event on the previous day will continue to run. For example, the controller will still be running plan 1 today if plan 1 was the last plan called for yesterday and there are no time-switch events specified for today. The controller will not revert to 'isolated' unless a specific time-switch entry to 'isolate' the controller is specified for today.	2
TSW **(CONT)**	**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 (page 87). If 'Special Holiday Periods' are configured using TSH (page 86) 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 on the following page…	

	DESCRIPTION AND REMARKS	
TSW **(CONT)**	Timetable Operation Codes: **TSW N 4 : 0** TSW N 5 : <Don't Care> The operation code '0' tells the controller 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 controller to start the CLF plan specified by 'TSW N 5'. For DVI35 Configurations, this operation accepts larger plan values so DVI35 Plans 1-32 can be requested by the Timetable. **TSW N 4 : 2** TSW N 5 : <Time-Switch Parameter Number 0 to 31> The operation code '2' tells the controller to select the time-switch parameter specified by 'TSW N 5'. **TSW N 4 : 3** TSW N 5 : <Time-Switch Event Number 0 to 31> The operation code '3' tells the controller to introduce the time-switch event specified by 'TSW N 5', without affecting any other time-switches. Note that when introducing time-switch events such as maximum green or DFM timesets, the controller automatically cancels the previous alternate time-switch; i.e. if timeset B was running when timeset C was introduced, time-switch for timeset B will automatically be cancelled. **TSW N 4 : 4** TSW N 5 : <Time-Switch Event Number 0 to 31> The operation code '4' tells the controller to cancel (i.e. 'clear' or 'reset') the time-switch event specified by 'TSW N 5', without affecting any other time-switches. Note: If the time-switch event to be cancelled is a maximum green or DFM timeset, the controller automatically cancels whichever timeset event is active. Therefore, to revert to timeset A, the timetable entry can request to cancel the event for the first alternate timeset, i.e. timeset B, even if another timeset is actually active.	

7.5 Timetable 'Holiday Clock' Commands

	DESCRIPTION AND REMARKS	
TSH	TSH <Entry 0 to 31> <0=Start / 1=End> : <Date DDMMMYY> The **T**imetable **S**pecial **H**oliday table defines up to 32 periods between the specified start and end dates (inclusive) where different time-switch events are executed, e.g. during school holidays. For example: `TSH 0 0:30-MAR-07` and `TSH 0 1:10-APR-07` These define a period from March 30th 2007 until April 10th 2007 inclusive where different time-switch events run. Time-switch events with the normal day codes, i.e. those in the range 0 to 15 (see TDY) would not run on the days during these special holiday periods. Add 100 to the day code in 'TSW N 0' (to give day codes in the range 100 to 115) on time-switch events that are to run only on days during these special holiday periods. Add 200 to the day code in 'TSW N 0' (to give day codes in the range 200 to 215) on time-switch events that are to run regardless of special holiday periods. Therefore: Day Codes / During a Holiday Period / Outside all Holiday Periods 0 to 15 / Ignored / Actioned 100 to 115 / Actioned / Ignored 200 to 215 / Actioned / Actioned **Notes:** Dates should be entered without the display '-' separator, for example by typing '`TSH 0 0=30MAR07↵`'. The two digit year field is assumed to be in the range 1970 to 2069, i.e. '00' to '69' = 2000 to 2069 and '70' to '99' = 1970 to 1999. To clear entry 'N' in the TSH table, simply enter '`TSH N 0=0↵`'. If either the start date or the end date for an entry in TSH is invalid, or the end date precedes the start date, that entry is ignored.	2

	DESCRIPTION AND REMARKS	
TSD	TSD <Entry 0 to 63> : <Date DDMMMYY> <Day Code 0 to 99> The **T**imetable **S**pecial **D**ays 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. **Day Codes Above 15** If the specified day code is not one of the normal timetable day codes in the range 0 to 15, only time-switch entries that use that exact day code number run on that date. For example '`TSD 0:25-DEC-XX 20`' would mean that only time-switch events with day code '`20`' would run on December 25th every year. **Day Codes 0 to 15** If the specified day code is one of the normal day codes that runs on just one day of the week (see TDY), the specified date is effectively turned into the specified day of the week. For example '`TSD 0:28-MAY-07 1`' specifies that 28th May 2007 (which was a Bank Holiday Monday) should actually run the timetable as though it was a Sunday (since day code 1 is normally the configured day code for Sunday). Therefore, on 28th May 2007, the controller would not run the normal time-switch events for Monday, but instead would run the normal time-switch events for Sunday, i.e. If Monday 28th May 2007 is outside all the holiday periods specified by TSH, time-switch entries with a day code of '1' (Sunday outside a holiday period), '7' (Everyday outside a holiday period), '201' (Every Sunday) or '207' (Everyday) will run. However, if Monday 28th May 2007 is within one of the holiday periods specified by TSH, time-switch entries with a day code of '101' (Sunday within a holiday period), '107' (Everyday within a holiday period), '201' (Every Sunday) or '207' (Everyday) will run. **Notes:** Dates should be entered without the '-' display separator, for example by typing '`TSD 0=28MAY07 20↵`'. The two digit year field is assumed to be in the range 1970 to 2069, i.e. '00' to '69' = 2000 to 2069 and '70' to '99' = 1970 to 1999. To clear entry 'N' in the TSD table, simply enter '`TSD N=0↵`'.	2

7.6 Cableless Link Facility (CLF) Configuration Commands

Note: The CLF facility will only be correctly synchronised to other controllers in the area if the time is set correctly. If the base time includes the date, e.g. midnight on the 1st January, the date must also be set correctly. The real time clock commands are described on page 82.

	DESCRIPTION AND REMARKS	
CYC	CYC <CLF Plan 0 to 15> : <0 to 254 seconds or 255 disables plan> **CYC**le time for the specified CLF plan, where 255 disabled the plan.	2
CSS	CSS : <CLF Step Size 1 or 2> Allows the **C**LF **S**tep **S**ize to be changed from the default of 1 second to 2 seconds. This doubles all the CLF time values and allows cycle times of over 500 seconds (with a resolution of 2 seconds). With a 2 second step size, the cycle timer increments and group timers decrement once every two seconds. For example, CYC:150 and CSS:2 produces a 300s cycle time. [Available from firmware 46059 issue 6 onwards]	2
PLT	PLT <CLF Plan 0 to 15> <CLF Group 0 to 31> : <0 to 255 seconds> **Pl**an **T**ime 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 that CLF group for that plan. Note: These times are specified as an offset from the start of the CLF cycle and that each stream will run a different CLF group, governed by which stages the group affects. This also means that the CLF groups can be defined in any order. Also note that two or more CLF groups which affect the same stream should not be given the same plan time as only one of them will be actioned, i.e. ensure that each group runs for at least one second before the next group is introduced.	2
PLE	PLE <CLF Plan 0 to 15> : <0 to 254 seconds or 255 for anytime> **Pl**an **E**ntry time for the specified CLF plan, i.e. the normal point in the cycle where this plan is required to start. While the controller is waiting for this point in the cycle to arrive, it will normally revert to VA mode. The value '255' indicates that this CLF plan can start at any point in its CLF cycle.	2
PLX	PLX <CLF Plan 0 to 15> : <0 to 254 seconds or 255 for anytime> **Pl**an e**X**it time for the specified CLF plan, i.e. the normal point in the cycle where this plan is required to finish. The controller will keep running this plan while is waiting for this point in the cycle to arrive. If the plan is being terminated because a higher priority mode is requested, e.g. a hurry call or manual mode, the plan terminates immediately and the new mode is allowed. The value '255' indicates that this CLF plan can exit at any point in its CLF cycle.	2

	DESCRIPTION AND REMARKS	
OFF	OFF <CLF Plan 0 to 15> <Time Part 0 or 1> : <0 to 255 secs/mins> CLF **OFF**set from the base time (e.g. 2am) for the specified CLF plan. Depending on the configuration, the time may be specified in minutes and seconds, i.e. OFF <Plan> 0 : <0 to 59 seconds> OFF <Plan> 1 : <0 to 255 minutes> or just seconds, i.e. OFF <Plan> 0 : <0 to 255 seconds>	2
PLI	PLI <CLF Plan 0 to 15> : <CLF Influence Set 0 to 15> **Pl**an **I**nfluence set used by the specified CLF Plan, i.e. which CLF influence set does this plan run.	2
IFS	IFS <CLF Inf. Set 0 to 15> <CLF Group 0 to 31> : <Stage 0 to 31, 255> **I**n**F**luence **S**tage, i.e. which stage (and thus which stream) does this group affect in the CLF influence set. 255 = no stage configured.	2
IFN	IFN <CLF Inf. Set 0 to 15> <CLF Group 0 to 31> : <Function 0 to 9, 255> **I**nfluence **F**u**N**ction, i.e. what function does this group perform in this CLF influence set. Each function code is described below : 0 – Isolate the whole stream to unrestricted VA such that phase MAXs have no effect (IFS specifies any stage in the stream). 1 – Apply a non-demand dependent force for stage specified by IFS. 2 – Apply a demand dependent force for stage specified by IFS. 3 – Hold the current stage (IFS specifies any stage in the stream). 4 – Prevent all stage moves except to the stage specified by IFS, if demanded and providing no extensions exist for terminating phases. Functions 5 to 7 should no longer be required: 5 – Apply a further non-demand dependent force for the stage specified by IFS, in addition to the force already present. 6 – Apply a further demand dependent force for the stage specified by IFS, in addition to the force already present. 7 – Ignore groups output and continue with previous influence (IFS specifies any stage in the stream). Functions 8 and 9 apply to stand-alone pedestrian streams only: 8 – Inhibit Pedestrian Phase (IFS specifies any stage in the stream). 9 – Allow Pedestrian Phase (IFS specifies any stage in the stream). 255 – No function configured.	2

	DESCRIPTION AND REMARKS	
PLF	PLF < CLF Plan 0 to 15> : <Fast Factor 0 to 80> The percentage by which the CLF Plan can run faster in order to synchronise with the clock after being introduced 'smoothly'. The range is from 0 to 80%. The value of zero disables this option. One or both PLF and PLS values must be non-zero to enable smooth CLF plan introduction. When both PLF and PLS values are non-zero, the controller decides which of the two values to adopt for smooth CLF plan introduction. Example: A fast value of 25% reduces a plan cycle time of 60 seconds down to 45 seconds causing the plan to run faster until it is synchronised with the clock. Caution: Care must be taken not to reduce the cycle time to a point where the controller will not be able to action the stage requests because the duration of the reduced group time is less than the sum of the intergreen and minimum green times; intergreen and minimum green times are not reduced by the fast percentage but retain their required periods.	
PLS	PLS < CLF Plan 0 to 15> : <Slow Factor 0 to 150> The percentage by which the CLF Plan can run slower in order to synchronise with the clock after being introduced 'smoothly'. The range is from 0 to 150%. The value of zero disables this option. One or both PLF and PLS values must be non-zero to enable smooth CLF plan introduction. When both PLF and PLS values are non-zero, the controller decides which of the two values to adopt for smooth CLF plan introduction. Example: A slow value of 50% increases a plan cycle time of 60 seconds up to 90 seconds causing the plan to run slower until it is synchronised with the clock.	

7.7 Cableless Link Facility (CLF) Maintenance Commands

	DESCRIPTION AND REMARKS	
CPL	CPL : <CLF Plan 0 to 15> **C**urrent CLF **PL**an is displayed. Use RPL to request a different plan.	R
RPL	RPL : <CLF Plan 0 to 15, or 255 to request 'isolate'> **R**equested CLF **PL**an displays the plan requested by the timetable and can be used by the operator to request a different plan until the next timetable event (or CCP is used). For DVI35 Configurations, the RPL command accepts larger values so DVI35 Plans 1-32 can be requested.	2
CCP	CCP : <Request (1) > **C**all **C**urrent **P**lan, i.e. when 'CCP=1' is entered, the controller re-scans the timetable and re-establishes the current CLF plan and time-switch events. Used to restore the controller back to 'normal operation' after RPL or SWS have been used for example.	2
SGT	SGT : <Request (1) > **S**ynchronise **G**roup **T**ime, i.e. reset the CLF plan back to time zero when 'SGT=1' is entered.	2
CCT	CCT : <seconds> **C**urrent **C**ycle **T**ime shows the incrementing cycle time for the CLF plan which is currently running.	R
CGR	CGR <Stream 0 to 7> : <CLF Group 0 to 31, 255> **C**urrent CLF **GR**oup is displayed for the specified stream. 255 = no CLF group configured on stream.	R
CGT	CGT <Stream 0 to 7> : <0 to 255 seconds> **C**urrent CLF **G**roup **T**ime remaining, counting down to the end of the current group, i.e. how long before the next group is due to start.	R
MTS	MTS : <Binary> **M**onitor **T**ime **S**tatus comprises an eight digit binary display in which the significance of each used bit is as follows: `MTS:00000001` – CLF mode not configured `MTS:00000010` – CLF mode disabled by Special Conditioning `MTS:00010000` – UTC FM (fallback mode) bit active `MTS:00100000` – No valid time, e.g. FLF 7 set `MTS:01000000` – CLF isolated `MTS:10000000` – Invalid plan called (cycle time either 0 or 255)	R

PFN	PFN <CLF Plan 0 to 15> <CLF Group 0 to 31> : <Function 0 to 15, 255> **P**lan **F**u**N**ction, i.e. what function does this group perform in the specified CLF plan. See IFN command for description of function numbers. Value 255 indicates no function configured. This command looks up the influence set assigned to the plan and displays the selected function for the CLF group i.e. it combines PLI and IFN commands. This command is read-only because other CLF Plans may be using the same Influence set.	R
PST	PST <CLF Plan 0 to 15> <CLF Group 0 to 31> : <Stage 0 to 31, 255> **P**lan **ST**age, i.e. which stage does this group affect in the specified CLF plan. Value 255 indicates no stage configured. This command looks up the influence set assigned to the plan and displays the affected stage for the CLF group i.e. it combines PLI and IFS commands. This command is read-only because other CLF Plans may be using the same Influence set.	R

8 GENERAL TIMING COMMANDS

8.1 Fundamental Timings

	DESCRIPTION AND REMARKS	
MIN	MIN <Phase A to F2> : <0 to 255 seconds> **MIN**imum green time for the specified phase.	3
MTV	MTV <Phase A to F2> : <0 to 255 seconds> **M**inimum green **T**hreshold **V**alues, i.e. the lower limit, below which a minimum green time cannot be set.	R
CFZ	CFZ <Phase A to F2> : <List Of Phases> **C**onflicting phases (**FZ**) displays the phases that are configured to conflict with the specified phase.	R
IGN	IGN <Losing Phase> <Gaining Phase> : <0 to 199 seconds or 'NC'> The minimum **I**nter**G**ree**N** time between the first phase losing right of way and the second phase gaining right of way, or 'NC' if the phases are not conflicting. The smallest intergreen allowed between two phases is not only limited by the configured lowered limit, see ITV, but also by the red/amber time of the gaining phase. Thus the smallest intergreen to any traffic phase is normally 2 seconds. This command cannot be used to change the intergreen times between phases in stand-alone pedestrian streams, see PAR and PIT on page 97. Also see PBT, CMX, CDY and CRD on page 94 for details on the pedestrian clearance period on both intersection and stand-alone pedestrian streams.	3
ITV	ITV <Losing Phase> <Gaining Phase> : <0 to 199 seconds> **I**ntergreen **T**hreshold **V**alues, i.e. the lower limit, below which an intergreen time cannot be set.	R
RLT	RLT <Losing Phase> <Gaining Phase> : <0 to 255 seconds> **R**ed **L**amp monitoring **T**ime, i.e. the time added to the intergreen time to delay the phase gaining right of way, usually a pedestrian phase, when the phase losing right of way, usually a traffic phase, has one or more red lamps missing (only if red lamp monitoring has been enabled). Not applicable to phases in stand-alone pedestrian streams.	3
IGS	IGS : <0 to 255 seconds> **I**nter**G**reen on **S**tart-up normally specifies the delay from the end of the amber leaving period to the other phases appearing at green.	3

	DESCRIPTION AND REMARKS	
RAT	RAT <Phase A to F2> : <0 to 255 seconds> **R**ed **A**mber **T**ime for the specified phase. Also known as the 'phase starting time' – see LAT for the 'phase leaving time'. Note that depending on how the lamp sequence for the phase has been configured, the red amber period may not use the RAT time, i.e. it may specify 2 seconds explicitly or the phase may not have a red/amber aspect, e.g. pedestrian or green arrow phases. Also note that any intergreen times to this phase must be as long or longer than the red/amber time otherwise the value will be rejected with a range error (`*R`).	3
LAT	LAT <MaxSet 0 to 7> <Phase A to F2> : <0.0 to 31.8 seconds> **L**eaving **A**spect (or 'leaving amber') **T**ime for the specified phase during the specified maxset, where maxset 0 equates to maxset A and maxset 7 equates to maxset H. Note that depending on how the lamp sequence for the phase has been configured, the leaving amber period may not use the LAT time. It may specify 3 seconds explicitly, be a pedestrian phase and use 'PBT' or the phase may not have a leaving aspect at all, e.g. a green arrow.	3

8.2 Pedestrian Clearance Period

	DESCRIPTION AND REMARKS	
PBT	PBT <Phase A to F2> : <0 to 255 seconds> **P**edestrian **B**lackout **T**ime for the specified phase. Note that depending on how the lamp sequence for the phase has been configured, this period may show a flashing green man rather than blackout or PBT may not be used by the specified phase at all. For pedestrian signals with on-crossing detectors, i.e. with CMX set to a non-zero value, PBT defines the minimum clearance period after which the extendable CMX period starts. Also note that pedestrian phase may be configured to show a red-man rather than blackout during the clearance period (e.g. near-sided pedestrian signals). In this case, the minimum red clearance period will be governed by the handset command IGN if that is larger than PBT plus the vehicle red/amber time. (These values are ignored on Pelican crossings, see PIT)	3
IPX	IPX <I/O Line Number 0 to 247> : <0.0 to 31.8 seconds> **I**n**P**ut e**X**tension time for the specified input line. On-crossing detector inputs can each be given individual extension times using IPX. The clearance period that is extendable by the on-crossing detectors is controlled by the CMX handset command. Also see section 6.3 Basic I/O Commands on page 73.	3

	DESCRIPTION AND REMARKS	
CMX	CMX <Phase A to F2> : <0 to 255 seconds> **C**learance **M**a**X**imum time for the specified pedestrian phase. After the PBT minimum clearance period, the pedestrian clearance period can be extended up to the time specified by CMX by the on-crossing detectors before running a clearance delay CDY. Set CMX to zero if no on-crossing detectors are fitted and the phase will just run the fixed period determined by PBT with both the CMX and CDY periods ignored. (These values are ignored on Pelican crossings, see PIT)	3
CDY	CDY <Phase A to F2> <Change Type 0 to 1> : <0 to 255 seconds (0 to 3 typically)> **C**learance **D**ela**Y** for the specified pedestrian phase runs when the CMX period finishes due to either the on-crossing detectors going inactive (gap change) or because it has ran to its defined maximum (max change). If the CMX time is set to zero, i.e. no extendable period, these times are ignored. CDY p 0 – gap change delay CDY p 1 – max change delay (These values are ignored on Pelican crossings, see PIT)	3
CRD	CRD <Phase A to F2> : <0 to 255 seconds (0 to 3 typically)> **C**learance **R**e**D** period for the specified pedestrian phase specifies the all-red period after the black-out clearance periods PBT, CMX and CDY before any conflicting phases are allowed to appear. The CRD values are ignored if the extendable period shows red-man not blackout. For intersections, CRD specifies the minimum all-red period. If IGN is set larger than PBT plus CRD plus the vehicle red/amber time, it will govern the all-red period between the pedestrian phase and the vehicle phase, even if CMX is set to 0, i.e. no on-crossing detectors. (These values are ignored on Pelican crossings, see PIT)	3

8.3 Pedestrian and Cycle Crossing Demands

	DESCRIPTION AND REMARKS	
IPX	IPX <I/O Line Number 0 to 247> : <0.0 to 31.8 seconds> **I**n**P**ut e**X**tension time for the specified input line. Pushbutton inputs, cycle detector inputs and kerbside detector inputs can each be given individual extension times using IPX. Also see section 6.3 Basic I/O Commands on page 73.	3
PDX	PDX <Phase A to F2> : <0.0 to 31.8 seconds (1.0 to 5.0 typically> **P**edestrian **D**emand e**X**tension. When all of the kerbside detectors are released and their IPX extension times have expired, the pedestrian demand is held for this period before being cancelled.	2
PDD	PDD <phase> : <0 to 255 seconds (0 to 3 typically)> **P**edestrian **D**emand **D**elay time delays the servicing of a push-button (or cycle demand) for the pedestrian phase to try to prevent conflicting vehicle phases terminating the instant the pushbutton is pressed, e.g. with Fixed Vehicle Periods or a Pre-Timed Max. The delay is not normally applied in VA mode, but is applied in all other modes. The delay does not delay demands from UTC 'D' bits, nor does it delay the illumination of the wait indicator. See the General Handbook for details.	2
CIL	CIL : <1 = Prevent Simultaneous Pedestrian Greens> **C**ross **I**nhibit **L**inking prevents both streams of a dual crossing appearing at pedestrian green at the same time, one will be forced to wait until the other has completed the pedestrian movement.	2

	DESCRIPTION AND REMARKS	
OPT PMV	OPT <Facility Number> : <Enabled (1) or Disabled (0)> PMV : <Integer value, see below> **P**edestrian **M**o**V**ement and other Stage movement **OPT**ions. The value of zero is the default and recommended value for most configurations. Consult Siemens in Poole if more information is required. Briefly, the features are: • PMV:1, OPT 0:1 – Next stage decision to include demands for type 1/3 phases in current stage. • PMV:2, OPT 1:1 – Don't temporarily hold the current stage at ROW to allow type 2/3 phases to appear in current stage. • PMV:4, OPT 2:1 – Don't insert artificial demands that force a stage change when RLM inhibits are cleared. • PMV:8, OPT 3:1 – On start-up, force optional phases in the start-up stage to ROW, even if no start-up demand is configured. • PMV:16, OPT 4:1 – Don't demand an alternate stage if a demanded phase can't appear in current stage (because it is of appearance type 1 for example). • PMV:32, OPT 5:1 – Exclude demands for phases already moving to ROW from FAZDEM. • PMV:64, OPT 6:1 – Stop phase gaining ROW if PWN closes before phase can appear. • PMV:128, OPT 7:1 – Use legacy FT and LFT mode implementations. With PMV, if two or more features are required, enter the sum. E.G. 'PMV=5' enables features 1 (OPT0) and 4 (OPT2).	2

8.4 Standalone Pedestrian Stream Timings

	DESCRIPTION AND REMARKS	
PAR	PAR <stream number> <change type> : <0 to 255 seconds (1 to 3 typically)> The **P**edestrian **A**ll **R**ed period defines the duration of the all red period between the vehicle phase amber leaving period and the pedestrian phase appearing at green for each different change type as follows: PAR n 0 – Gap change in VA mode PAR n 1 – Max change (or extension inhibit by UTC 'SC' bit). PAR n 2 – FVP mode PAR n 3 – UTC controlled change (UTC 'PV' vehicle inhibit) PAR n 4 – Link controlled change ('PV1' local link inhibit or CLF influences 8 and 9, see IFN) Where n = stand-alone pedestrian stream number, or n! = intersection stream (values are ignored, use IGN instead) **NOTE:** It is a UK requirement that the all red time is overridden to 3 seconds if SDE or SA is configured (i.e. SDS is non-zero) and one or more SDE/SA assessors are configured on a phase in the stream.	3

	DESCRIPTION AND REMARKS	
PIT	PIT <stream number> <intergreen step 0 to 3> : <0 to 255 seconds> **P**elican **I**ntergreen **T**ime defines the intergreen period between the pelican pedestrian phase and the pelican vehicle phase on the specified stand-alone pedestrian stream: PIT n 0 – Vehicle steady red / pedestrian flashing green PIT n 1 – Vehicle flashing amber / pedestrian flashing green PIT n 2 – Vehicle flashing amber / pedestrian steady red PIT n 3 – When leaving the quiescent all-red state (if configured), the vehicle phase appears at flashing amber (with the ped. phase remaining at red) for the time specified by "PIT n 3" before appearing at green. Where n = stand-alone pedestrian stream number or n! = intersection stream (values are ignored) (These values are ignored on Puffin and Toucan crossings)	3

Note: All the other timings for stand-alone pedestrian streams are accessed using the normal handset commands, e.g.

Use 'MIN' for the phases' minimum green times (see section 8.1).
Use 'PBT' and 'CMX' for the ped' clearance period (see section 8.2).
Use 'MAX' for the vehicle maximum green time (see section 8.10).

Also see section 8.12 'UTC' and section 8.13 'Local Linking' for the commands associated with the UTC PV and local link PV1 inputs.

8.5 All-Red Extensions

	DESCRIPTION AND REMARKS	
REX	REX <Stream 0 to 7> : <0.0 to 31.8 seconds> All **R**ed **Ex**tension time for the specified stream.	2
RMX	RMX <Stream 0 to 7> : <0 to 255 seconds> All **R**ed **M**a**X**imum time for the specified stream, normally timed from the point at which the first phase is about to start its red to green sequence.	2

8.6 Intergreen Delays

	DESCRIPTION AND REMARKS	
IDG	IDG <Intergreen Delay 0 to 63> : <Gaining Phases> **I**ntergreen **D**elay **G**aining phases. For example “IDG 0:ABF2” identifies phases A, B and F2 as the phases gaining RoW for intergreen delay 0.	R
IDI	IDI <Phase> : <Inhibited (1), Not inhibited (0)> **I**ntergreen **D**elay **I**nhibited phase. The associated phase is currently being prevented from gaining RoW by an intergreen delay.	R
IDL	IDL <Intergreen Delay 0 to 63> : <Losing Phase> **I**ntergreen **D**elay **L**osing phase. For example “IDL 0:A” identifies phase A as the phase losing RoW for intergreen delay 0.	R
IDP	IDP <Intergreen Delay 0 to 63> : <Period 0 to 255 seconds> **I**ntergreen **D**elay Maximum Intergreen **P**eriod. The maximum delay which can be applied by the intergreen delay to the associated phases gaining RoW.	3

8.7 Phase Delays

	DESCRIPTION AND REMARKS	
DFZ	DFZ <Delay Number 0 to 119> : <Phase A to F2> **D**elay phase (abbr. ‘**FZ**’), i.e. the specified delay affects this phase.	2
DMF	DMF <Delay Number 0 to 119> : <Stage 0 to 31> **D**elay **M**ove **F**rom the specified stage, i.e. the specified delay only comes into effect on the move from the DMF stage to the DMT stage.	2
DMT	DMT <Delay Number 0 to 119> : <Stage 0 to 31> **D**elay **M**ove **T**o the specified stage, i.e. the specified delay only comes into effect on the move from the DMF stage to the DMT stage.	2
DPG	DPG <Delay Number 0 to 119> : <0 to 255 seconds> **D**elay **P**hase **G**reen, i.e. how long to prolong (or delay) the phase specified by DFZ on the movement from the stage specified by DMF to that specified by DMT. If the phase is leaving right of way during the stage movement defined for this delay, DPG specifies how long to keep the phase at green after the stage movement starts; i.e. it prolongs the appearance of the phase. If the phase is gaining right of way during the stage movement defined for this delay, DPG prevents it from appearing for the specified time after the stage movement starts; i.e. it delays the appearance of the phase.	2

8.8 Special Conditioning Commands

Special conditioning can be used to provide a wide range of facilities.

Refer to the work specification for details of what Special Conditioning facilities have been provided on a particular controller.

	DESCRIPTION AND REMARKS	
CDT	CDT <Timer 0 to 479> : <0 to 255> / <0.0 to 31.8> Special **C**on**D**itioning **T**imers. Value is viewed as 0 to 255 seconds or 0.0 to 31.8 seconds according to the timer type i.e. counts in seconds or 200ms. ST950 firmware 46059 issue 5 increases the number of timers available from 96 to 480.	2
XCT	XCT <Set 1 to 32> <Timer 0 to 479> : <0 to 255> / <0.0 to 31.8> E**x**tended Special **C**onditioning **T**imers. Extends 'CDT' for DVI35 Configurations to provide up to 32 different sets of time values that can be called up at different times (via S/C). In DVI35 configuration these may also be referred to as Parameter Values.	2
CFE	CFE <Facility Number 0 to 63> : <0 (Disabled) or 1 (Enabled)> **C**onditioning **F**acility **E**nable.	3
CFF	CFF <Flag Number 0 to 1023> : <0 or 1> Conditioning Facility Flags. Available from ST950 firmware 46059 issue 5 onwards.	2
INT	INT <0 to 99> : <-32768 to 32767> View the value of the 16-bit signed integer mnemonics used by Special Conditioning, e.g. "INT 0" displays the value held in the "INT0" mnemonic. Available from ST950 firmware 46059 issue 22 onwards.	R

The following sections describe the handset commands associated with each of the modes of the traffic controller (except CLF, which starts on page 88 in the Master Time Clock section).

8.9 Fixed Time Mode

Note that the handset commands used by fixed time operation depend on the type of fixed time mode configured:

- FIX/FTS for FT mode (independent intersection streams)
- LFT/LFS for LFT mode (Linked FT mode: synchronised intersection streams)
- MAX for FTCM mode (Fixed Time to Current Maximums)
- MEX for FVP mode (Fixed Vehicle Period on stand-alone pedestrian streams)

The description of MAX and MEX can be found on page 102.

	DESCRIPTION AND REMARKS	
FIX	FIX <Stage 0 to 31> : <0 to 255 seconds> **FIX**ed time period for the specified stage, i.e. how long the stage should run for, excluding the intergreens, etc., during fixed time mode.	2
FTS	FTS <Stage 0 to 31> : <Next Stage 0 to 31> **F**ixed **T**ime **S**equence: for the specified stage, which stage is to appear next.	R
LFS	LFS <Stream 0 to 7> <Step Number 0 to 31> : <Stage 0 to 31 or 255> **L**inked **F**ixed Time **S**tage. Displays the stage number which should be activated on the specified stream when the linked fixed time step is active. The step number range is configured by IC4.	R
LFT	LFT <Stage Combination 0 to 31> : <0 to 255 seconds> **L**inked **F**ixed **T**ime period for the specified combination of stages on a multi-stream controller.	2

8.10 VA Operation Timings

	DESCRIPTION AND REMARKS	
PEV	PEV <Stream Number 0 to 7> : <Setting 0 to 2> **P**edestrian **E**nable **V**ehicle actuated (VA) mode: 0 = Fixed Vehicle Period operation (VA mode disabled) 1 = VA mode enabled (manual panel can select VA or FVP mode) 2 = VA mode enabled and requested (FVP mode disabled) This command is only available on stand-alone pedestrian streams. ***Important*** If no vehicle detectors are fitted, enter 'PEV <s> = 0↵' for each stream number <s> to disable VA mode and request FVP operation. Also see PTM which enables and disables pre-timed maximums. (This command replaces the T400 Pelican command VAD)	3
EXT	EXT <Phase A to F2> : <0.0 to 31.8 seconds> Green **EXT**ension time for the specified phase. Values are rounded up to the next even decimal; e.g. 1.5s is rounded up to 1.6s. Also see IPX below…	2
IPX	IPX <I/O Line Number 0 to 247> : <0.0 to 31.8 seconds> **I**n**P**ut e**X**tension time for the specified input line. Detectors that extend the phase green period can be assigned individual extension times using IPX, in which case the time for the phase should be configured to zero using EXT. If the EXT time is non-zero, the IPX and EXT times will be added together. Also see section 6.3 'Basic I/O Commands' on page 73.	3
MAX MBX MCX MDX	MAX <Phase A to F2> : <0 to 255 seconds> **MAX**imum vehicle green time for the specified phase in maxsets A to D. If alternate maxsets are used at different times of day, the 'MAX' command accesses the maximum green times that are used during maxset A, with the 'MBX', 'MCX' and 'MDX' times used during maxsets B, C and D respectively.	2
MEX MFX MGX MHX	MEX <Phase A to F2> : <0 to 255 seconds> On intersection streams, these commands specify the **M**a**X**imum green times for the specified phase during maxsets **E** to **H**. On a stand-alone pedestrian stream, these commands specify the fixed vehicle period when running FVP mode. The 'MEX' times are used during maxset A, with the 'MFX', 'MGX' and 'MHX' times used during maxsets B, C and D respectively.	2
PTM	PTM <Phase A to F2> : <Enabled (1) or Disabled (0)> Enables and disables **P**re-**T**imed **M**aximum on the requested vehicle phase, i.e. the maximum green timer starts when the phase gains right of way, regardless of whether there is an opposing demand present. Can be used on intersection phases as well as stand-alone pedestrian phases.	2

	DESCRIPTION AND REMARKS	
PTX	PTX <Phase A to F2> : <0 to 255 seconds (0 to 10 typically)> **P**re-**T**imed Maximum e**X**tra period for the specified vehicle phase. If the opposing demand is inserted after the normal pre-timed maximum period (see PTM and MAX) has expired, the maximum green timer is restarted with this time period. This stops the specified phase terminating the instant an opposing demand is inserted if vehicle extensions are present. Instead, the phase will remain at right of way for this period (unless the extensions cease earlier). Since this facility provides a delay between pressing the pedestrian pushbutton and the vehicle phase terminating just like normal VA mode, the PDD pedestrian demand delay time is not applied.	2
PWN	PWN <Stage 0 to 31> : <0 to 255 seconds> **P**edestrian **W**i**N**dow period runs alongside the maximum green times and can be used to prevent demand dependant pedestrian phases appearing towards the end of a stage, when the maximum green times are close to expiring. ***Important*** This window period is started when an opposing demand starts the maximum green timer of a phase running in the stage, except in UTC mode when it always starts at the beginning of the stage; see MCM.	2
MCM	MCM <Mode 1 to 17> : <Options 0 to 2> From firmware 46059 issue 9 onwards, this setting controls how the Maximum Green (MAX) and Pedestrian Window (PWN) timers operate in each mode. The available options are: 0: The Maximum Green and Window timers only start if there are opposing demands present. 1: The Maximum Green timers start when there are opposing demands, but the Window timer starts regardless. 2: Regardless of opposing demands, the Maximum Green timers are held reset and the Window timer always starts. Usually UTC Mode uses option 2 and all other modes use option 0. To change the settings for MOVA Mode, refer to page 111.	2

8.11 Manual Mode / Manual Panel

	DESCRIPTION AND REMARKS	
MND	MND : <Manual Disabled> **M**a**N**ual mode **D**isabled if this command is set to '1'. To enable manual mode, enter 'MND=0'.	2
STP	STP <Stage Combination 0 to 31> : <0 or 1 to 255 seconds> Manual **St**e**P**-on time for the specified stage combination. '0' means the controller remains in the stage until a new stage is requested on the manual panel. Any other value defines how long the controller should remain in the stage before automatically moving on to the next stage.	2
MPA	MPA <MPA Function 0 to 3> : <Manual Panel AUX button> **M**anual **P**anel **A**llocation of specific functions to the spare manual panel SW buttons and AUX indicators. The four functions are: MPA 0 – Dim Override – forces signals to bright when pressed. MPA 1 – Computer Control LED – lit if any UTC PV bit is active. MPA 2 – Local Link Disable – disables PV1 on all standalone streams. MPA 3 – Remote Reconnect – sets the UTC 'RR' reply bit. Use the following values to assign a function to a spare button/indicator: '`MPA n=18`' SW1 button and AUX1 LED provide function 'n' '`MPA n=19`' SW2 button and AUX2 LED provide function 'n' '`MPA n=5`' SW3 button and AUX3 LED provide function 'n' '`MPA n=255`' Function 'n' not allocated to any button or LED	3
LPT	LPT : <Request (0 or 1)> **L**am**P** **T**est for the Manual Panel LEDs and the Cabinet Alarm indicator. Entering 'LPT=1' illuminates those LEDs for 3 seconds.	2

The following commands may be useful if a manual panel is not fitted:

CCI	CCI <Stream 0 to 7> : <UTC Active>	(see page 105)	R
LLD	LLD <Stream 0 to 7> : <1 = Disable Local Link>	(see page 106)	2
PEV	PEV <Stream Number 0 to 7> : <Setting 0 to 2>	(see page 102)	3
PHD	PHD <Phase A to F2> : <Continuous demand (1)>	(see page 66)	2
PHE	PHE <Phase A to F2> :<Continuous extension (1)>	(see page 66)	2
RDF	RDF : <Request DFM Reset (1) >	(see page 75)	2
RMR	RMR : <1 = Set the UTC RR Bit>	(see page 105)	2

8.12 UTC

	DESCRIPTION AND REMARKS	
DIT	DIT : <0 = UTC Dim Override or 1 = Local Link Dim Request> Specifies the **Di**mming **T**ype for the 'SO' input, i.e. whether this input is a UTC 'override to bright' input or a local link 'dim request' input.	2
UIE	UIE <Stream 0 to 7> : <0 to 255 seconds> **U**TC **I**nhibit **E**xtensions period for the specified stand-alone pedestrian stream defines the window time after the PV bit is de-activated during which the vehicle extensions are inhibited and the pedestrian demands are allowed. **NOTE:** Re-applying the PV bit during the window has no effect on its period, i.e. vehicle extensions are still inhibited and pedestrian demands are still serviced.	2
CCI	CCI <Stream 0 to 7> : <UTC Active> **C**omputer **C**ontrol **I**ndication for the specified stand-alone pedestrian stream shows a non-zero value while the UTC PV bit is active.	R
TOT	TOT : <Computer Control LED Operation 0 or 1> If the UTC **T**ake **O**ver **T**ype is set to '0', the computer control LED on the manual panel (see MPA 1) is only illuminated if a PV control bit is active on at least one of the stand-alone pedestrian streams. If it is set to '1', the computer control LED is illuminated when the TC/TO control bit is active, even if no PV bit is actually active.	2
RMR	RMR : <1 = Set the UTC RR Bit> **R**e**M**ote **R**econnect will set the UTC RR bit (if so configured) Ensure that this flag is set back to zero on leaving the site.	2
UWD	UWD : <12 - 30 (120 – 300 secs)> The **U**TC force bit **W**atch**D**og timeout period; if any UTC Force bit remains active for longer than this configured period, FLF 60 (page 58) is set and UTC mode is disabled. UTC mode is allowed again once the force bit goes inactive. The default is 20; a timeout period of 200 seconds. The values 0 and 255 disable the check. **IMPORTANT:** The check needs to be manually disabled (using UWD=0) on controllers where MOVA is using the free-standing UTC interface. The check is automatically disabled when the internal MOVA mode or 'Serial MOVA' is used.	2

8.13 Local Linking

	DESCRIPTION AND REMARKS	
DIT	DIT : <0 = UTC Dim Override or 1 = Local Link Dim Request> Specifies the **Di**mming **T**ype for the 'SO' input, i.e. whether this input is an UTC 'override to bright' input or a local link 'dim request' input.	2
LLD	LLD <Stream 0 to 7> : <0 = Enable Local Link, 1 = Disable Local Link> **L**ocal **L**ink **D**isable will disable the PV1 facility on the specified stand-alone pedestrian stream.	2
LKD	LKD <Stream 0 to 7> : <0 to 255 seconds> **L**in**K** **D**elay time for the specified stand-alone pedestrian stream.	2
LKW	LKW <Stream 0 to 7> : <0 to 255 seconds> **L**in**K** **W**indow time for the specified stand-alone pedestrian stream.	2
LKO	LKO <Stream 0 to 7> : <1 to 255 seconds, 0 = No override timer> **L**in**K** **O**verride time for the specified stand-alone pedestrian stream provides the facility described in MCE0125 where the pedestrian phase is allowed to appear if the PV1 signal is active for longer than the override time but no fault is reported. The override mode can be selected using LKM.	2
LKM	LKM 0 = 1 enables self-resetting **L**in**K** override (LKO) timer **M**ode: `LKM 0:0` – When the override timer expires, the controller will disable the PV1 input and revert to normal operation with the pedestrian phase no longer inhibited. It will only resume PV1 control when PV1 is released and then re-asserted. `LKM 0:1` – When the override timer expires, the controller will run the pedestrian delay and window periods and then return to PV1 operation (inhibiting the pedestrian). The override timer will then restart if required (see LKM 1). LKM 1 = 1 enables demand dependant **L**in**K** override timer **M**ode: `LKM 1:0` – The override timer is started when both PV1 and the vehicle green are active, regardless of whether there is a demand for the pedestrian phase. `LKM 1:1` – The override timer is started when PV1 and the vehicle green and a pedestrian demand are all active.	2
LKA	LKA <Stream 0 to 7> : <1 to 255 minutes, 0 = No fail active time> **L**in**K** **A**ctive fail time for the specified stand-alone pedestrian stream.	2
LKI	LKI <Stream 0 to 7> : <1 to 255 minutes, 0 = No fail inactive time> **L**in**K** **I**nactive fail time for the specified stand-alone pedestrian stream. The link active fail time (**LKA**) and a link inactive fail time (**LKI**) provide the facility described in MCE0145. If the PV1 input remains active or inactive for longer than these times, a fault flag is set and the pedestrian phase is inhibited until the fault is cleared. A short pulse on the PV1 input will restart the link fail timers preventing them expiring but will not release PV1 control.	2

8.14 Hurry Call

	DESCRIPTION AND REMARKS	
DHC	DHC <Unit Number 0 to 7> : <0 to 255 seconds> **D**elay **H**urry **C**all; i.e. delay implementing the hurry call following activation of the input.	2
HHC	HHC <Unit Number 0 to 7> : <0 to 255 seconds> **H**old **H**urry **C**all; i.e. how long to hold the called stage.	2
PHC	PHC <Unit Number 0 to 7> : <0 to 255 seconds> **P**revent **H**urry **C**all for this period, timed from the start of the hurry call stage. Further activations of the hurry call request are ignored until after this time.	2
SHC	SHC <Unit Number 0 to 7> : <Status 0 to 3> **S**tatus of **H**urry **C**all specified, where the values indicate: 0 – Hurry call inactive 2 – Holding hurry call stage 1 – Forcing hurry call stage 3 – Timing hurry call delay	R

8.15 Priority Configuration Commands

	DESCRIPTION AND REMARKS	
PUP	PUP <Unit Number 0 to 7> <Phase A to F2> : <Yes(1) or No(0)> **P**riority **U**nit's **P**hase, i.e. displays a '1' if the phase is assigned to this priority unit, otherwise '0' is displayed.	R
PUT	PUT <Unit Number 0 to 7> : <Bus Priority (1) or Emergency (2)> **P**riority **U**nit **T**ype, either (bus) priority or emergency vehicle.	R
PDE	PDE <Unit Number 0 to 7> <Alt Time Set 0 to 3*> : <Enable(1) or Disable(0)> **P**riority **D**emand **E**nable, i.e. if set to zero, the priority unit is disabled during that alternate timeset.	2
PFD	PFD <Unit Number 0 to 7> : <0 to 255 seconds> The **P**riority unit's **F**irst **D**elay time	2
PSD	PSD <Unit Number 0 to 7> : <0 to 255 seconds> The **P**riority unit's **S**econd **D**elay time.	2

	DESCRIPTION AND REMARKS	
PSS	PSS <Unit Number 0 to 7> <Phase A to F2> : <Strategy 0 to 2> **P**riority **S**trategy **S**election, i.e. how VA demands are affected by the priority unit. The PSS command effectively combines the legacy commands PSA and PSE. 0 = VA demands for the phase are ignored when the unit is making its priority moves. 1 = A VA demand for the phase is allowed when the unit is making its priority moves (same as PSA x y:1). 2 = A demand for the phase is introduced when the unit is making its priority moves (same as PSE x y:1).	2
PRI	PRI <Unit Number 0 to 7> <Alt Time Set 0 to 3*> : <Disable(0) or Enable(1)> Revertive Demands to Enable Inhibit Timer if set to non-zero.	2
PFZ	PFZ <Unit Number 0 to 7> : <Phase A to F2> **P**riority unit's phase (abbr. **'FZ')**, i.e. displays the phase assigned to this priority unit.	R
PVI	PVI <Unit Number 0 to 7> <Alt Time Set 0 to 3*> : <0 to 255 seconds> **P**riority **V**ehicle **I**nhibit time for the priority unit during the alternate timeset.	2
PVE	PVE <Unit Number 0 to 7> <Alt Time Set 0 to 3*> : <0.0 to 31.8 seconds> **P**riority **V**ehicle **E**xtension time for the priority unit's priority phase during the alternate timeset.	2
PVM	PVM <Unit Number 0 to 7> <Alt Time Set 0 to 3*> : <0 to 255 seconds> **P**riority **V**ehicle **M**aximum green time for the specified priority unit's priority phase during the specified alternate timeset.	2
PRE	PRE <Unit Number 0 to 7> <Alt Time Set 0 to 3*> : <Reversion Enable(1) or Disable(0)> The **P**riority **R**eversion demand is **E**nabled for the specified priority unit during the specified alternate timeset.	2
PCA PCB … PF2	PCA <Unit Number 0 to 7> <Alt Time Set 0 to 3*> : <0 to 255 seconds> **P**riority **C**ompensation time for phase **A** for the specified priority unit during the specified alternate timeset. The commands PCB, PCC, PCD to PCZ should be used to access the compensation times for phases B, C, D to Z, and the commands PA2, PB2, PC2 to PF2 should be used to access the compensation times for phases A2, B2, C2 to F2.	2

	DESCRIPTION AND REMARKS	
PMT	PMT <Unit Number 0 to 7> : <0 to 255 in 10 second units> **P**riority **M**onitor **T**ime for the specified priority unit in the range 0 to 2550 seconds. If the priority input is active for longer than this period, the input is ignored. For priority inputs, a priority DFM fault (FLF 18 on page 45) is set.	2
PVG	PVG <Unit Number 0 to 7> : <0 to 255 seconds> **P**riority **V**ehicle **G**ap time (or interrupt period) for the specified priority unit. This is the number of seconds that the priority input must be inactive before the controller treats the input as inactive for priority DFM purposes.	2
PDR	PDR <Unit Number 0 to 7> : <0 to 255> **P**riority **D**FM self-**R**eset enabled if set non-zero. Zero means manual reset. 1 or 255 means Automatic Reset when input goes inactive. Any other value specifies the N'th activation on which the fault will be cleared and a priority demand accepted, e.g. the value of 16 should be used to clear the fault after the 15th activation, allowing the 16th activation to demand the priority unit (TR2500A recommendation if automatic reset used).	2
PUN	PUN <Unit Number 0 to 7> <Unit Number 0 to 7>: <0 or 1> **P**riority **U**nits i**N**hibited after the priority unit's phase has gained right of way. Values: 0=not inhibited, 1=inhibited, e.g. 'PUN 3 7:1' means that when the phase demanded by priority unit 3 gains right-of-way, it inhibits priority unit 7. The PUN command effectively replaces the legacy command PUI.	2

Priority Alt Sets 0 runs when timeset A or E is running, set 1 when B or F, etc…

8.16 Priority Maintenance Commands

	DESCRIPTION AND REMARKS	
PVU	PVU <Unit Number 0 to 7> : <Binary> **P**riority **V**ehicle **U**nit's status for the specified priority unit where each binary bit has the following meaning if set to a '1' rather than '0': 00000001 – Minimum green Period running on Priority Phase 00000010 – VA Demand for Priority Phase or VA extensions 00000100 – Priority Demand/Revertive Demand Stored 00001000 – Priority Extension Timer Running 00010000 – Normal Max. Expired on Phase 00100000 – Priority Max. Timer Running 01000000 – Inhibit Period Timer Running 10000000 – Any Other Priority Demands Present	R

	DESCRIPTION AND REMARKS	
PVP	PVP <Phase A to F2> : <Binary> **P**riority **V**ehicle **P**hase information, i.e. the state of the specified phase where each binary bit has the following meaning if set to a '1': `00000001` – VA demand or extension timer running `00000010` – Priority demand stored or extension present `00000100` – Normal maximum timer running `00001000` – Compensation period timer running `00010000` – Priority maximum timer running `00100000` – Request for compensation for this phase `01000000` – This phase inhibited `10000000` – Priority demands present for other phases	R
PVS	PVS <Stage 0 to 31> : <Binary> **P**riority **V**ehicle **S**tage information, i.e. the state of the specified stage where each binary bit has the following meaning if set to a '1': `00000001` – At least one phase in this stage is in minimum green `00000010` – VA request active for one of the phases in this stage `00000100` – Priority request active for one of the phases in this stage `00001000` – Max. timer running for one of the phases in this stage `00010000` – Unused `00100000` – Priority max. running for one of the phases in this stage `01000000` – Compensation timer running for one of the phases… `10000000` – A priority demand exists that is not served by the phases in this stage	R

PIA	PIA : <Binary>
	Priority **I**nhibit timers **A**ctive. If a binary bit is set to a '1', it means that the inhibit timer for the appropriate priority unit is running, where the position of the bit identifies the units 7 to 0:-
	`PIA:XXXXXXXX`
	`7......0`
		R

PDS	PDS : <Binary>
	Priority **D**emand/extension **S**tatus. If a binary bit is set to a '1', it means that there is a priority demand or priority extension request present for the appropriate priority unit, where the position of the bit identifies the units 7 to 0:-
	`PDS:XXXXXXXX`
	`7......0`
		R

PIU	PIU : <Binary>
	Priority: **I**nhibited **U**nits. If a binary bit is set to a '1', it means that the appropriate priority unit is currently being inhibited, where the position of the bit identifies the units 7 to 0:-
	`PIU:XXXXXXXX`
	`7......0`
		R

8.17 MOVA

	DESCRIPTION AND REMARKS	
MVC	MVC : <0 = Disable; 10 to 2550 seconds> **M**O**V**A **C**ontrol Timer specifies the time to wait for MOVA mode to take control before the CRB is deactivated for the MVD period. Only values in multiples of ten seconds are permitted. The default value is 240 seconds, i.e. 4 minutes.	2
MVD	MVD : <0 = Disable; 0.2 to 31.8> **M**O**V**A **D**eactivate Period and the default value is 0.2 seconds MVD specifies the time that the CRB is deactivated after the MVC period has elapsed before it is activated again.	2
MVR	MVR : <0 to 255> **M**O**V**A **R**elease Timer and the default value is 1 seconds MVR specifies the period of time the controller continues to maintain the confirm bits after the controller deactivates the CRB. This is to allow time for MOVA to detect the deactivation of the CRB before the confirm bits change state.	2
MVU	MVU : <0 = MOVA, 1 = UTC> **M**O**V**A reported as **U**TC mode. The default value is 0. For compatibility with older external equipment this item can be set to 1 and then MOVA mode (mode 16) will be reported as UTC mode (mode 6) by the MOD handset command (page 148). From firmware 46059 issue 9 onwards, this setting also impacts the reporting of LRT mode. If MVU:1 is set, LRT mode (mode 17) is reported as Priority mode (mode 13).	2
MCM	MCM <16 (MOVA Mode)> : <Options 0 to 2> From firmware 46059 issue 9 onwards, this setting controls how the Maximum Green (MAX) and Pedestrian Window (PWN) timers operate in each mode. To change the settings for MOVA Mode (mode 16), use 'MCM 16'. The available options are: 0: The Maximum Green and Window timers only start if there are opposing demands present. 1: The Maximum Green timers start when there are opposing demands, but the Window timer starts regardless. 2: Regardless of opposing demands, the Maximum Green timers are held reset and the Window timer always starts. For comparison, VA Mode would normally use option 0 and UTC Mode would use option 2. Option 1 provides a compromise, with the Window timer starting automatically, but Max Green timers only starting there are opposing demands.	2

8.18 LRT

	DESCRIPTION AND REMARKS	
LAA LAB LAC LAD LAE LAF LAG LAH	LAx <Unit 0 to 15> <Step 0 to 5> : <Period 0 to 254 seconds> **L**RT **A**dvance influence period for timeset **x** (x=A to H). One value (0 to 254s) per unit and influence step. For example: `LAB 3 0:180` LRT Unit 3, Advance Influence Step 0 Timeset B value is currently set to 180 seconds. The value 255 indicates that the Influence is to be omitted.	2
LAQ	LAQ <Unit 0 to 15> <Step 0 to 5> : <Influence Function 0 to 12> **L**RT **A**dvance influence function for a given step in all timesets (A to H). One function code (0-12) per unit and step). Valid function codes for LRT: 0 – “Do Nothing” and exit LRT mode 1 – “Immediate Move” to the next stage containing the specified phase 2 – “Demand Dependant Move” to the next stage containing the specified phase 3 – “Hold” prevent all stage moves in the stage-stream 4 – “Allow Move” to the next stage containing the specified phase 5 – “Add Immediate Move” to add another phase 6 – “Add Demand Dependant Move” to add another phase 10 – “Add a Latched Demand” for the specified phase 11 – “Insert an LRT Request” (and a latched demand) 12 – “Add Allow Move” to add another phase For example: `LAQ 1 0:1` LRT Unit 1, Advance Influence Step 0 is currently set to function type 1 “Immediate Move”	2
LAR	LAR <Unit 0 to 15> <Step 0 to 5> : <Phase A to F2> **L**RT **A**dvance influence phase associated for a given influence step in all timesets (A to H).	2

	DESCRIPTION AND REMARKS	
LAS	LAS <Unit 0 to 15>: <Prepare Status, Advance Status> **L**RT **A**dvance influence **S**tatus in the form 'AD<Advance delay timer count> <Advance influence function><Advance phase> <Advance influence timer count>' For example, 'LAS 0:-,11NA 10' indicates Advance Influence "Insert an LRT Request" is active and has ten seconds left to run (note that the Phase associated with this Influence is **N**ot **A**pplicable) Note that the LPS (Prepare Status) and LAS (Advance Status) commands both show the status of the Prepare and Advance Influences; both commands show the same information.	R
LCA LCB LCC LCD LCE LCF LCG LCH	LCx <Unit 0 to 15> <Phase A to F2> : <Time 0 to 255 seconds> **L**RT **C**ompensation time in seconds for a given phase in timeset **x** (x=A to H). Gives the extra time for which a phase will be permitted to remain at ROW, beyond its configured maximum green time, the next time this phase gains ROW. This time is applied if this phase was skipped or curtailed as a result of an LRT stage movement.	2
LDA	LDA <Unit 0 to 15> <Timeset A to H> : <Delay 0 to 255 seconds> **L**RT **D**elay for **A**dvance event in seconds. The delay after an Advance Loop Event (detection) has been activated before any Advance Influence actions commence.	2
LDC	LDC <Unit 0 to 15> <Timeset A to H> : <Delay 0 to 255 seconds> **L**RT **D**elay for **C**ancel event in seconds. The delay after a Cancel Loop Event (detection) has been activated before the Cancel actions commence.	2
LDP	LDP <Unit 0 to 15> <Timeset A to H> : <Delay 0 to 255 seconds> **L**RT **D**elay for **P**repare event in seconds. The delay after a Prepare Loop Event (detection) has been activated before any Prepare Influence actions commence.	2

	DESCRIPTION AND REMARKS	
LDS	LDS <Unit 0 to 15> : <Status> **L**RT **D**elay and event **S**tatus. Shows the Status of the Delays associated with an LRT unit, as well as which Events have been triggered. The first part of the display shows which events have been received: P-Prepare, A-Advance, S-Stopline Presence and C-Stopline Cleared. It will normally show "----", then when the Prepare Event has been triggered it shows "P---", then "PA--", "PAS-" and finally "PASC" until the Cancel Event (or Cancel Event Timeout) occurs. The display also shows which, if any, delay timers are active, limited by the display width. Each timer is indentified by two letters and are displayed in the following order: PR-Prepare event delay, AD-Advance event delay, SP-Stopline Presence event delay, SI-Stopline Influence period, SC-Stopline Cleared event delay, CE-Cancel Event delay, CT-Cancel Timeout, MX-Phase Green Maximum, OW-Overlap Window, OI-Overlap Inhibit, and FI-Follow Inhibit. Example: `LDS 15:PASC,CT30,OI99` All four events have been triggered and the facility is waiting for the Cancel Event and the Cancel Timer is running (and has 30 seconds remaining). The Overlap Inhibit timer is also active and has 99 seconds remaining.	R
LEC	LEC <Unit 0 to 15> <Timeset A to H> : <Timeout 0 to 255 seconds> **L**RT **C**ancel **E**vent timeout in seconds. Used to trigger the Cancel actions on expiry, in case the Cancel Event is missed or does not occur, and will run if opposing demands are present while an LRT Phase is at ROW. Note that a value of zero seconds will result in the Cancel actions being run as soon as the LRT Phase gains ROW, if opposing demands are present.	2
LFI	LFI <Unit 0 to 15> <Timeset A to H> : <Period 0 to 2550 seconds> **L**RT **F**ollowing **I**nhibit period in seconds. Inhibits the LRT Unit becoming the controlling unit again (e.g. by a following tram) for this time period. Only values in multiples of ten seconds are allowed.	2
LFP	LFP <Unit 0 to 15> : <Count 0 to 2550 seconds> **L**RT **F**ollowing inhibit count in seconds. Time remaining on the Follow Inhibit Period Timer.	R

	DESCRIPTION AND REMARKS	
LIS	LIS <Unit 0 to 15> : <Status> **L**RT **I**nhibit **S**tatus. Values as follows: • 1 = indicates this unit is being inhibited by the first come, first served logic • 2 = indicates this unit is being inhibited by the Overlap Inhibit period of another LRT Unit • 4 = indicates this unit is being inhibited by the Follow Inhibit period of the previous tram A zero value indicates this LRT Unit is not inhibited. If two inhibits are active, the sum of the values is displayed.	R
LOI	LOI <Unit 0 to 15> <Timeset A to H> : <Period 0 to 2550 seconds> **L**RT **O**verlap **I**nhibit period in seconds. Inhibits the configured selection of LRT units for this period. This period starts after the Overlap Window Period has expired. Only values in multiples of ten seconds are allowed.	2
LOP	LOP <Unit 0 to 15> : <Count 0 to 2550 seconds> **L**RT **O**verlap inhibit count in seconds. Time remaining on the Overlap Inhibit Period Timer.	R
LOW	LOW <Unit 0 to 15> <Timeset A to H> : <Period 0 to 255 seconds> **L**RT **O**verlap **W**indow period in seconds. Time remaining on the Overlap Window Period Timer.	2
LPA LPB LPC LPD LPE LPF LPG LPH	LPx <Unit 0 to 15> <Step 0 to 5> : <Period 0 to 254 seconds> **L**RT **P**repare influence period for timeset **x** (x=A to H). One value (0 to 254s) per unit, timeset and influence step. For example: `LPB 1 0:180` LRT Unit 1, Prepare Influence Step 0 Timeset B value is currently set to 180 seconds. The value 255 indicates that the Influence is to be omitted.	2
LPQ	LPQ <Unit 0 to 15> <Step 0 to 5> : <Function 0 to 12> **L**RT **P**repare influence function for a given step in all timesets (A to H). One function code (0-12) per timeset, unit and step (only timeset A supported initially, i.e. timeset A value refers to all timesets). Valid function codes for LRT as for LAQ	2
LPR	LPR <Unit 0 to 15> <Step 0 to 5> : <Phase A to F2> **L**RT **P**repare influence phase for a given step in all timesets (A to H) (only timeset A supported initially, i.e. timeset A value refers to all timesets).	2

	DESCRIPTION AND REMARKS	
LPS	LPS <Unit 0 to 15> <Step 0 to 5> : <Prepare Status, Advance Status> **L**RT **P**repare influence **S**tatus in the form 'PR<Prepare delay timer count> <Prepare influence function><Prepare phase> <Prepare influence timer count> For example, 'LPS 15 5: 3NA 10,-' indicates Prepare Influence "Hold" is active and has ten seconds left to run (note that the Phase associated with this Influence is **N**ot **A**pplicable) Note that the LPS (Prepare Status) and LAS (Advance Status) commands both show the status of the Prepare and Advance Influences; both commands show the same information.	R
LSC	LSC <Unit 0 to 15> <Timeset A to H> : <Delay 0 to 255 seconds> **L**RT **S**topline **C**leared Delay in seconds. The delay after a stop line loop event (detection) is cleared before stop line cleared influences are applied.	2
LSI	LSI <Unit 0 to 15> <Timeset A to H> : <Period 0 to 255 seconds> **L**RT **S**topline presence **I**nfluence period in seconds.	2
LSP	LSP <Unit 0 to 15> <Timeset A to H> : <Delay 0 to 255 seconds> **L**RT **S**topline **P**resence delay in seconds. The delay after a stop line event (detection) has been activated before stop line influences are applied.	2
LUP	LUP <Unit 0 to 15> : <Phase A to F2> **L**RT **U**nit **P**hase. The phase associated with the LRT Unit.	R

	DESCRIPTION AND REMARKS	

LUS	LUS <Unit 0 to 15> : <Status>
	LRT **U**nit **S**tatus. The LUS command shows the status of the specified LRT unit. The command shows if this LRT unit is inhibited by another LRT unit (see examples below). It then attempts to show the information from all the LRT status commands on one line, in the following order and subject to the handset display width: Events triggered ("PASC" from LDS), Influences active (from LPQ/LAQ), delays active (from LDS).
	Example: `LUS 15:PA--,1 B 20`
	The Prepare and Advance Events have been triggered, and the Advance influence Immediate Move to Phase B has 20 seconds remaining. Note that because the display shows which events have been triggered, it can be implied whether they are Prepare or Advance Influences.
	This unit is being inhibited by the first come, first served logic.
	`LUS 15:FIFO,----`
	This unit is being inhibited by the Overlap Inhibit period of another LRT Unit.
	`LUS 15:LOI,----`
	This unit is being inhibited by the Follow Inhibit period of the previous tram.
	`LUS 15:LFI,----`
		R

8.19 Phase and Stage Settings

The following commands are read-only and display settings configured by IC4.

	DESCRIPTION AND REMARKS	
FAZ	FAZ : <2 to 32 phases> Number of phases, including any dummy phases.	R
STG	STG : <2 to 32 stages> Number of **ST**a**G**es, including any all-red stages.	R
FZT	FZT <Phase A to F2> : <Lamp Sequence Set 0 to 7> Phase (**FZ**) **T**ype, i.e. the lamp sequence set used by each phase.	R
PHT	PHT <Phase A to F2> : <Phase Type 0 to 4> **PH**ase **T**ype of each phase, i.e. the 'Sequence Type' defined for the Lamp Sequence, where 0 = Traffic/LRT, 1 = Pedestrian, 2 = Green Arrow, 3 = UK Pelican Vehicle, 4 = UK Pelican Pedestrian.	R

	DESCRIPTION AND REMARKS	
TYG	TYG <Gaining Types 1, 2 or 3> : <Phases> Different **TY**pes of **G**aining right of way i.e. which optional phases are assigned to the three types of gaining right of way. For example, 'TYG 1:CDE' indicates that phases C, D and E are configured as 'type 1', i.e. appear in the stage only if a demand was present when the controller started the stage to stage move. Type 2 phases will appear when a demand is detected at any point during the stage. Type 3 phases are similar to type 2 phases, except the phase will not appear if the window time for the stage has expired (also see PWN) 'TYG n:(none)' indicates no phases assigned to gaining type 'n'.	R
FZA	FZA <Phase A to F2> : <Phase A to F2> Phase (**FZ**) **A**ssociated with the specified phase. See FZL.	R
FZL	FZL <Phase A to F2> : <Leaving Type 0, 1 or 2> Phase (**FZ**) **L**eaving type, i.e. the leaving type of the specified phase. Leaving Type 0 is the normal leaving type; i.e. the phase leaves right of way when the stage finishes. Leaving Types 1 and 2 are normally only used for green arrows, so that the green arrow extinguishes when the associated phase, see FZA, gains (type 1) or leaves (type 2) right of way.	R
FFZ	FFZ <Stage 0 to 31> : <Phases> **F**ixed phases (**FZ**) in the specified stage.	R
OFZ	OFZ <Stage 0 to 31> : <Phases> All the phases in the specified stage including **O**ptional phases (**FZ**). 'OFZ n:(none)' indicates no phases in stage 'n'.	R
AFZ	AFZ : <Phases> **A**rterial reversion: the phase or phases (**FZ**) demanded in the absence of any other demands at the junction. 'AFZ:(none)' indicates no phases demanded.	R
AST	AST <Stream> : <Stage 0 to 31> **A**rterial reversion: the **ST**age demanded in the absence of any other demands at the junction. 'AST n:(none)' indicates no stage demanded.	R

	DESCRIPTION AND REMARKS	
AM1	AM1 <Stage 0 to 31> <Stage 0 to 31> : <Stage or 200, 201 or 255> **A**lternate **M**ove set **1** defines the alternative or prevented moves for the selection of modes set-up in the configuration, while 'AM2' accesses the second set of alternate moves for a different selection of modes. If the value is a stage, it specifies the required alternative move. For example, 'AM1 2 1:3' configures the controller to move to stage 3 instead of making the move from stage 2 to 1. The value of '200' prohibits the move; i.e. the controller should not make the configured move and should not attempt to look for another other stage movements. The value of '201' ignores the move; i.e. the controller should not make the configured move but should look for another movement. The value of '255' allows the stage movement.	R
AM2	AM2 <Stage 0 to 31> <Stage 0 to 31> : <Stage or 200, 201 or 255> **A**lternate **M**ove set **2** is similar to 'AM1', except that it accesses set 2; i.e. is used by a different set of modes.	R

8.20 Miscellaneous

	DESCRIPTION AND REMARKS	
RSO	RSO <Setting 0 to 9> : <Value 0 to 255> **R**eserve **S**tate **O**ptions. While the Application restarts to load new firmware or a new configuration for example, the signals enter a configured 'Reserve State'. **RSO 0 : <0=Off (default), 1=Shutdown>** The controller can be configured to shutdown if the Application fails during entry to the Reserve State or fails to return within the time-out period. The RSO 1, RSO 2 and RSO 3 values are not used. **RSO 4 : <1 to 255 seconds (0=Use software default)>** Override the Reserve State Time-out period. If the Application fails to return within this period, further actions are taken (such as shutdown above). **RSO 5: <1 to 255 seconds (0=Use software default)>** Override the Reserve State Entry Time-out period. If the sequence for entry to the Reserve State does not complete within this period, the Application restarts anyway. **RSO 6: <0 to 255>** Part-time if entry fails. Non-zero forces signals immediately to their part-time state if the Application fails during entry to the Reserve State. One bit per stream so each stream can be configured independently, or simply use 255 if all streams should enter part-time on the failure. **RSO 7: <1 to 255 hours (0=Use software default)>** Override the Reserve State latch time. The fourth entry in to the Reserve State within this period (normally 24 hours) is latched so the controller will not resume normal operation until manually reset or power off/on. **RSO 8: <Confirm count increment (0=Use software default)>** **RSO 9: <Confirm count threshold (0=Use software default)>** Override the default values used to confirm failure of the Application. Do not change unless instructed by Siemens.	3

	DESCRIPTION AND REMARKS	
RST	RST <Setting 0 to 4> : <Value 0 to 255> **Rest**art Supervisor. To prevent intermittent faults switching the Traffic Signals off and on repeatedly in quick succession, a Restart Supervisor is used to monitor the time between requests to restart the signals. Available from firmware 46059 issue 21 onwards on Plus+ Controllers only. To disable the feature, use RST0=0. Example: If an intermittent fault causes the signals to extinguish shortly after starting, then assuming the default values are used, each restart attempt would be postponed and separated by 2 minutes, 5 minutes, 15 minutes, 15 minutes, then every 4 hours. **RST 0 : <0:Disable, 1 to 255 minutes, default 2 minutes>** This period starts when the signals start-up. While this period is active, the Restart Supervisor is 'activated'. While 'activated', the Restart Supervisor monitors for the signals being extinguished by a fault and attempting to automatically restart when the fault clears. a) If the signals are not requested to restart again within this period, the Restart Supervisor is 'deactivated'. The next restart will be considered the first and the checking starts again using this RST0 period. b) If the signals are requested to restart within this RST0 period, then: • a fault is raised • the signals do not restart but remain extinguished • this state continues until the RST0 period ends, when: • the fault is cleared automatically • the signal start-up sequence is attempted • the next configurable period (RST1) is started to check for a subsequent switch off and restart **RST 1 : <0:Disable, 1 to 255 minutes, default 5 minutes>** The RST1 period starts after the RST0 period if a signal restart is detected within the RST0 period. Its actions are the same as for RST0. **RST 2 : <0:Disable, 1 to 255 minutes, default 15 minutes>** The RST2 period starts after the RST1 period if a signal restart is detected within the RST1 period. Its actions are the same as for RST0. This period repeats until the RST3 count is reached. **RST 3 : <0:Disable, Count 1 to 255, default 6>** The RST3 count is associated with the RST4 time, e.g. monitoring for a 6th restart is performed over a 4-hour period. **RST 4 : <0:Disable, 1 to 255 hours, default 4 hours>** The RST4 period starts after the RST2 period if a signal restart is detected within the RST2 period and the total number of restarts is about to reach the RST3 count. Its actions are the same as for RST0. This period repeats until no signal restart is detected within the period.	2

9 LAMP MONITORING

Note that to keep compatibility with the T400 and the TC12 OTUs lamp monitors, most of the controller's lamp monitor handset commands still start with the letter 'K'.

9.1 Lamp Monitoring Maintenance Commands

	DESCRIPTION AND REMARKS	
KLR	KLR : <Request> **L**amp monitor **R**eset can be requested using 'KLR=1↵'. This clears all lamp faults and restarts learning on all sensors. This should not be used to clear normal lamp faults since replacing the faulty lamps should automatically clear the lamp fault flag FLF55. To emphasise this, 'KLR=1↵' will not function if KRD (see below) should be used.	3
KML	KML : <phase/colour or sensor/aspect> <percentage learnt> **M**onitor the lamp monitor **L**earning the lamp loads. Enter 'KML=1' to initiate the learning assistance or 'KML=0' to cancel the assistance. Also see page 126.	3
KEV	KEV : <volts> **E**lectrical **V**olts displays the lamp supply voltage in volts. If the value displayed differs from the measured RMS voltage, enter the correct value to calibrate the measurement, e.g. "KEV=230".	3

<table>
<tr><th></th><th>DESCRIPTION AND REMARKS</th><th></th></tr>
<tr><td>KES</td><td>KES <Sensor 1 to 96> : <current> <phase/colour>
Electrical Sensor displays the current being read in milliamps, and if possible, which phase and colour this applies to.
NOTE: Even if there is current passing through the sensor, the controller may decide that it is inappropriate to monitor the current at this time, e.g. while the supply voltage is out of range or the combination of aspects that are illuminated is not monitored:
<table>
<tr><th>Message</th><th>Monitoring suspended because…</th></tr>
<tr><td>LampsOff</td><td>Monitoring has been suspended while the lamp supply is off or very low; see the KEV handset command above.</td></tr>
<tr><td>Suspend</td><td>This sensor is configured not to monitor the pattern of aspects that are illuminated, or it is waiting to allow the switch on surge to dissipate.
Examples: Traffic red/amber, ped black-out, flashing periods, etc.</td></tr>
<tr><td>HiLoKEV</td><td>Monitoring has been suspended on this sensor while the supply voltage is too low or too high; see the KEV handset command above.</td></tr>
<tr><td>[KLE:0]</td><td>The lamp monitor is disabled; see the KLE command (page 140).</td></tr>
<tr><td>[KLT:0]</td><td>Monitoring has been disabled on this sensor; see the KLT handset command (page 133).</td></tr>
<tr><td>[RLM:0]</td><td>This sensor is on a pedestrian stream disabled by the RLM handset command, e.g. “RLM 1=0” (page 135).</td></tr>
<tr><td>NotMon</td><td>Not Monitored; Monitoring on this sensor has been disabled or is not configured correctly. Check the setting selected by the KLT handset command for example.</td></tr>
<tr><td>CLS:R+W</td><td>Monitoring with an on-board LV sensor has been suspended while both LED Red Man and Wait Signals are illuminated; see the KLT handset command (page 133).</td></tr>
</table>
On a wide display (see WID), the lamp supply voltage (in volts) and learnt load (in watts) will also be displayed. While the sensor is learning a load change or dim/bright change, the learnt load will freeze and be followed by a question mark, e.g. '150W?'.
KES <sensor>:<current> <voltage> <phase/colour>:<learnt load></td><td>R</td></tr>
<tr><td>KEL</td><td>KEL <Sensor 1 to 96> <Aspect 0 to 6> : <watts> <phase/colour>
Electrical Load displays the learnt load for each Aspect Pattern* of each sensor in watts, and if possible, which phase and colour this applies to.
While the initial load is being learnt, a question mark will be appended to the learnt load, e.g. '200W?’, and on a wide display (see WID), the percentage learnt is also shown, e.g.
<code>KEL 1 0:200W? A/Red (50%)</code>
If the display is not wide enough and the load has not yet been learnt in either the Dim or Bright state, then rather than displaying ‘0W?’, the percentage learnt is displayed:
<code>1 0:0% A/Red</code>
This value will increment from ‘0%’ to ‘50%’ and then change to ‘200W?’ for example.
See section 9.4 on page 126 for more information on the learning process and this percentage value.
Note that the load shown for fluorescent tubes and LED Signals can be much higher than the actual power taken by those signals since it is calculated assuming that the current is sinusoidal and in phase with the supply voltage.
* See section 9.2 on page 125 for information on ‘Aspect Patterns’.</td><td>R</td></tr>
</table>

	DESCRIPTION AND REMARKS	
KLD	KLD <Sensor 1 to 96> <Aspect 0 to 6> : <watts> <phase/colour> **L**amp **L**oad **D**ropped command automatically scans through showing any active lamp faults and then displays the missing load in watts, and if possible, which phase and colour this applies to. Entering '=0↵' can be used to clear erroneous lamp faults, except those red lamps used for Red Lamp Monitoring; see section 9.6.2 on page 128.	3
KRD	KRD : <Request> **R**LM '**D**elete' – used when a second red lamp fault has extinguished the traffic signals, see page 129.	3

9.2 Sensor and Aspect Numbers

9.2.1 Sensor Numbers

The lamp monitor can be configured with a number of sensors to monitor various signals attached to the controller.

On LV traffic controllers, the 32 internal sensors on the lamp switch cards (numbered 1 to 32) monitor the 32 phases A to F2. Sensors 33 to 48 are general-purpose external sensors, four on each lamp switch card.

LV Traffic Controllers

L/S Card 4		L/S Card 3		L/S Card 2		L/S Card 1	
25	Y	17	Q	9	I	1	A
26	Z	18	R	10	J	2	B
27	A2	19	S	11	K	3	C
28	B2	20	T	12	L	4	D
29	C2	21	U	13	M	5	E
30	D2	22	V	14	N	6	F
31	E2	23	W	15	O	7	G
32	F2	24	X	16	P	8	H
45	Ext13	41	Ext9	37	Ext5	33	Ext1
46	Ext14	42	Ext10	38	Ext6	34	Ext2
47	Ext15	43	Ext11	39	Ext7	35	Ext3
48	Ext16	44	Ext12	40	Ext8	36	Ext4

On ELV traffic controllers, up to 96 sensors are available and the allocation of sensors is flexible. Refer to the IC4 printout or LMU Readings web page for details.

9.2.2 Aspect Patterns

Each sensor is configured with a particular Sensor Type that specifies the colours it should monitor. These colours are assigned aspect pattern numbers and each sensor can monitor up to 7 different aspect patterns numbered 0 to 6.

The table below shows the assignments between the aspect pattern numbers and the colours monitored for a typical 3 aspect signal, a typical 2 aspect signal with wait and a single aspect indicators such as green arrows and regulatory signs.

Aspect Pattern	3 Aspect Signal	2 Aspect Signal with Wait	Single Aspect Indicator
0	Red	Red (while waits are off)	Off
1	Green	Green	On
2	Amber	Red and Wait illuminated	-
3	Flashing Part-Time State	Flashing Part-Time State	-
4	-	-	-
5	-	-	-
6	-	(Wait Only)*	-

* The controller calculates the wait lamp faults from the ‘Red Only’ and ‘Red and Wait’ lamp fault results.

9.3 Initial Load Learning

Powering up the controller for the first time will automatically start the lamp monitor learning the junction.

IMPORTANT: If the controller has been previously powered up in a depot with the signals switched ON, then the lamp monitor should be manually reset so it can learn the signals that are actually fitted on-street.

To be sure that each controller output has been learnt, at least 3 complete cycles should be allowed. Note: some controllers may have outputs (phases) which only appear under certain conditions. The commissioning engineer may decide to force these to appear (where possible) to ensure they are learnt before leaving the site.

Once an output has been learnt, the LMU will commence monitoring automatically.

During the learning cycle, the commissioning engineer should walk around the junction pressing any pedestrian push buttons that have wait indicators with them, and checking that there are no lamp failures already present on the junction. Any failed lamps should be replaced and the learning restarted (KLR=1).

When the lamp monitor has learnt an output, the command ‘KEL’ will display the learnt load in watts, making it easy to verify that the lamp monitor has correctly learnt the output. For example, if there are three signals heads connected to phase A, and each is fitted with standard 230V 50W halogen lamps, the expected load learnt would be somewhere around 150W, e.g.

```
KEL 1 0:155W A/Red
```

9.4 Monitoring Learning

To monitor how learning is progressing, use the ‘KML’ command.

The KML shows when the lamp monitor is learning a particular phase and colour (with the ‘percentage learnt’ incrementing accordingly). While no lamp loads are being learnt, the command automatically cycles through the phases and colours that still have not been learnt.

`KML:A/Red 0%`	Phase A’s Red is 0% learnt, i.e. the lamp monitor has not seen phase A red illuminated.
`KML:A/Green 50%`	Phase A’s Green is 50% learnt, i.e. the lamp monitor has learnt the current in either dim or bright but learning is not complete until the lamp monitor has learnt the current in both states.

KML:A/Amber 25%	Phase A's Amber is 25% learnt, i.e. the lamp monitor has started to learn the current but the colour has not yet been illuminated for long enough.
KML:Awaiting D/B	The lamp monitor has finished learning all the currents in the present dim or bright state and is waiting for a change to the other state in order to complete the learning process. Also see KDP (page 65).
KML:A/Red 100%	The lamp monitor has completely learnt phase A's Red.
KML:S33/A1 0%	The external sensor number 33, aspect pattern 1 has not yet been learnt. Most configurations will be defaulted to provide spare sensors that can be used to monitor regulatory signs, which can only be learnt and monitored during bright. If no signs are fitted, the lamp monitor will happily learn zero current.
KML:Complete	Learning is complete; i.e. the lamp monitor has successfully learnt all of the currents of the junction. If lamp diming is required but learning is marked as complete even though no dim/bright changes have occurred, check the KDP setting (page 65).
KML:LMU Disabled	Lamp monitoring has not been enabled in the configuration.

9.5 Learning Assistance

Entering 'KML=1↵' may assist the learning process. While KML=1 is active:

- The controller will insert artificial demands for all phases (except those configured with no demand on power-up) in an attempt to ensure that all of the aspects that the lamp monitor needs to learn do appear.

- The controller will override the solar cell and force the signals dim when all the lamps have been learnt in bright and vice versa, so that the lamp monitor can continue the learning process. This will not occur with the KDP settings 'KDP:0' and 'KDP:2' (see page 65).

Warning **Use with care** –
Dim signals may be difficult for the traffic to see during daylight hours!

When learning is complete, or 'KML=0↵' is entered, or KML times out after 20 minutes, the artificial demands and the override on the solar cell will cease.

9.6 Resolving Lamp Faults

9.6.1 Lamp Failures

When a lamp fault occurs, the lamp load drops. When the controller confirms this, fault flag 55 is set (see page 57) and KLD indicates the missing load on which phase and colour, e.g.

```
KLD 1 0:49W A/Red
```

When a subsequent lamp fault on the same sensor and colour is confirmed, the load dropped value in 'KLD' will increase to show the total load dropped, e.g. from 'A/Red 50W' to 'A/Red 100W' when a second 50W lamp fails.

9.6.2 Lamp Replacements

When the failed signals are replaced, the 'KLD' value for the total load dropped will decrease. When all the failed signals have been replaced, the load dropped returns to zero, e.g. 'A/Red 0W'.

The lamp monitor must be given time to confirm any bulb replacement before the fault is automatically cleared.

A lamp fault may not be cleared automatically if there has been a mismatch between load that has been reported as failed and the replacement load. This may occur if the current initially increased due to a transformer fault for example. The fault will also not clear automatically if the load dropped exceeds 255 watts, due to a feeder failure for example.

In these cases, it is necessary to issue a KLR=1 command to fully reset the lamp monitor and then follow the normal commissioning sequence as described in section 9.3 starting on page 126.

There is an alternative procedure that saves time but this must only be used if it is fully understood and, in the interests of safety, this requires Level-3 access and will not clear red lamp faults used for Red Lamp Monitoring. While viewing the KLD entry, if the lamps can be seen to be working correctly and KEL has been checked to ensure that the lamp monitor has correctly learnt the load, the KLD fault value can be cleared by simply entering '=0↵'.

9.6.3 Unexpected Load Increase

If a sensor confirms an unexpected increase in the load but no lamp failures had been confirmed previously, an event such as 'A/Red+49W' is logged, but FLF 55 and KLD are not set.

If, for example, one lamp was not working when the lamp monitor was last reset and this lamp has only now been replaced then 'A/Red+49W' will be logged. In these cases, reset the lamp monitor again as instructed in section 9.3 on page 126.

If LED Signals are being monitored and all signals appeared to be working when the lamp monitor was commissioned, then it would imply that the signal is faulty and is consuming more power than before. A typical fault is when the LED Signal remains Bright when the controller switches the supply Dim. Check that the dim lamp supply (KEV) is below 160V (LV) or 30V (ELV) with a normal mains supply input. Visually inspect the signals on this phase/colour for possible damage and to ensure that the brightness of the signal changes as the controller switched between the Bright and Dim voltages. If this does not identify the faulty signal, consider swapping the individual signals with others at the site and monitor where the fault 'moves to' to identify the faulty signal.

9.7 RLM Faults

If the lamps have been extinguished, e.g. because two red lamp failures have been confirmed on a part-time or stand-alone pedestrian stream, refer to section 9.7.2.

9.7.1 RLM Faults; Signals Still Illuminated

Where the controller lamps are still illuminated, the normal lamp replacement sequence of locating and replacing the failed lamp will suffice.

'RFL=1↵' may be required to clear the red lamp monitor fault (FLF 22) if first or second red lamp failures have been configured as 'Only Cleared by Manual Reset'.

9.7.2 RLM Faults that Extinguish the Signals

When the controller has extinguished the signals on a part-time or stand-alone pedestrian stream due to a second red lamp fault, the following procedure should be used…

1) Check the Load Dropped command (KLD) for entries and replace any lamps in the red aspects that are reported as faulty.

2) Enter 'KRD=1↵' to temporarily remove the second red lamp fault. In effect this tells the lamp monitor to 'delete' the confirmation of the second red lamp fault and re-instate the previous learnt load and fault status, e.g. just a single missing lamp.

   Important If the fault was detected while the controller was still initially learning the junction, also enter 'KLR=1↵' to reset the lamp monitor and restart learning.

   KRD=1 can also be achieved by simply holding down the level 3 push-button for 10 seconds if no handset is available.

3) The lamps should switch on and perform the normal start-up sequence and, providing that there are not two red lamps missing anymore, remain on.

4) Check that all red lamps are operating correctly.

The second red lamp faults will be re-instated and the signals extinguished three minutes after entering 'KRD=1↵' if the reds are not illuminated within this time.

If the extinguished stream or streams do not start-up automatically, this may be due to one or more of the following. Note that the controller will probably be configured to run a standard 7-second blackout period before illuminating the lights starting with the amber leaving period.

a) A part-time controller may remain blacked-out in part-time mode due to the time of day.

b) 'RFL=1↵' may be required to clear the red lamp monitor fault (FLF 22) if the second red lamp failure has been configured as 'Only Cleared by Manual Reset'.

c) The controller's power may need to be switched off and back on because it cannot restart the stream due to the way it has been configured, e.g. not all the phases in the stream are blacked-out.

9.8 Simulating Lamp Loads

If it is required to run a controller configured for red lamp monitoring without lamp loads, the lamp supply should be switched OFF on the manual panel before entering 'KLR=1↵' to reset the lamp monitor and 'RFL=1↵' to clear the RLM faults. This allows the controller to run with the signals switched off.

Alternatively, the controller can simulate lamp loads ***with the signals switched on***. Entering the Level-3 'SLA' access code will attempt to start the lamp load simulator facility.

This access code will immediately be cleared back to zero and no simulated lamp loads will be introduced if any of the following conditions are true:

- If the lamp monitor is not enabled.
- If the lamp monitor has failed.
- If any sensor has learnt a load higher than its configured threshold.

Once the simulated lamp loads are running, the access code will be automatically cleared, terminating the simulation, when any of the following events occur:

- Any sensor detects a real current.
- The power is switched off for more than 60 seconds.

These checks ensure that the simulated lamp loads are never used on the street where real lamps have been connected.

When the simulation starts, the lamp monitor is automatically reset so that the new simulated loads can be learnt and any old lamp faults are cleared. Similarly, when the simulation ends, the lamp monitor is again reset.

The ‘Simulated Lamp Loads’ can be changed using the handset command ‘SLL’ (also Level-3). For mains (LV) working, each phase and colour will initially have a simulated load of 200W, which can then be reduced to150W to simulate a lamp fault using this handset command. The default for ELV is 40W to simulate four 10W signals.

	DESCRIPTION AND REMARKS	
SLA	SLA : <Access Code> **S**imulated **L**amps **A**ccess is used to enter the access code that starts the simulated lamp loads facility. If the display returns to ‘SLA:0’, the facility has refused to start, either because lamp monitoring is not enabled or because real lamp loads are connected.	3
SLL	SLL <Phase A to F2> <Colour ‘R’, ‘A’, or ‘G’> : <0 to 255 watts> **S**imulated **L**amp **L**oad for the specified phase and colour. The default value and display format depend on the controller type: SLL A R:200W..... LV Controllers (KLV:0 or KLV:1) SLL A R:4.0 ..... ELV LED Controllers (KLV:2) SLL A R:200W (4.0) ..... LV LED Controllers (KLV:3+) Enter ‘=1’ to simulate one lamp load, or ‘=2’ for two, etc. Since the default load is 4 lamps, enter ‘=3’ to simulate one failure. Enter ‘=0’ to simulate a feeder failure or Last Lamp failure. To simulate a specific number of watts, enter ‘=5W’ for example. For LED signals, the facility creates a simulated current based on the KLT load type, e.g. 10W for each LED signal. On ELV controllers, the display shows the number of signals being simulated rather than the number of watts, e.g. ‘SLL A R:4.0’. On LV controllers with LED signals (KLV:3+ and KLT not set to 255) the facility assumes ‘200W’ still requires just four signals so it displays ‘SLL A R:200W (4.0)’ and simulates a load of just 40W for example.	3

9.9 Lamp Monitoring Configuration Commands

	DESCRIPTION AND REMARKS	
KLC	KLC : <1 to 255 seconds> **L**amp **C**onfirm time defines the number of seconds of illumination over which the Lamp Monitor confirms any lamp failure or replacement. **NOTE:** For Red Lamp Monitoring, see the handset command ‘RLS’.	2

<table>
<tr><th></th><th>DESCRIPTION AND REMARKS</th><th></th></tr>
<tr><td>RLS</td><td>RLS : <0=Slow, 1=Special, 2=Fast if 2 or less lamps, …>
Defines the first Red Lamp Speed (confirmation time) setting. The ‘slow’ confirmation time defaults to 3 seconds and ‘fast’ is fixed at <500ms.
Red Lamp Monitoring is a compromise between finding lamp faults quickly to ensure safe operation of the traffic signals and not reporting spurious lamp faults, which could cause the signals to be extinguished or pedestrian phases to be inhibited inappropriately. Therefore, to improve the robustness of the Controller, the speed at which a first red lamp fault is confirmed can be adjusted.
This setting only applies to first red lamp faults on Intersection streams. The following red lamp faults are always confirmed quickly:
• First red lamp faults on stand alone pedestrian streams.
• Second red lamp faults on any type of Controller.
• ‘Feeder failures’ on any type of Controller.
The settings are:
RLS:0 – ‘Slow Always’ (default)
RLS:1 – ‘Special’
The first red lamp fault will be confirmed quickly if it initially appears that two (or more) lamps have failed simultaneously. Otherwise, the fault is confirmed slowly (as RLS:0).
RLS:2 – ‘Fast if only 2 lamps fitted’
The speed that a first red lamp fault is confirmed on a particular red aspect depends on the number of red lamps fitted on that red. A first red lamp fault will be confirmed quickly if only 2 lamps are fitted. If more lamps are fitted, the lamp monitor will be more cautious when confirming the first red lamp fault.
RLS:N (where 2<N<9) – ‘Fast if only N lamps fitted’
As for RLS:2, except the lamp fault is confirmed quickly if ‘N’ lamps or less are fitted. For example, RLS:4 means fast if 4 or less, slow if more than 4.
RLS:9 – ‘Fast always’.</td><td>2</td></tr>
<tr><td>KLV</td><td>KLV : <Lamp Supply Voltage Type (0-3)>
The configured Lamp Supply Voltage Type.
This single value configures the whole controller to expect signals of a particular type. The following table shows the options available.
<table><tr><th>Value</th><th>Description</th></tr><tr><td>KLV:0</td><td>200-240V (incandescent)</td></tr><tr><td>KLV:1</td><td>100-120V (incandescent)</td></tr><tr><td>KLV:2</td><td>40-48V (ELV Controllers only)</td></tr><tr><td>KLV:3</td><td>200-240V LED</td></tr></table>Changing the value will result in a lamp monitor reset and relearn.
‘Incandescent’ includes fluorescent tubes as well as LED signals that simulate an incandescent lamp load, e.g. ‘Helios CLS+LMF’ and ‘Helios LED’ Signals.
‘KLV:2’ is specific to the ELV Controllers; all other values are for the LV Controllers.
If the KLV and KLT settings are set up by IC4 or the web pages, only the KLV:3 value is shown for LV LED operation. Alternatively, the handset command KLV=3 (or higher) can still be used to select LV LED operation <u>and</u> initialise all the KLT settings as with ST800 and ST900 LED Retrofit Controllers; see KLT which follows. If the handset command KLV=3 (or higher) is explicitly used to change the settings, always review all the KLT settings afterwards and refer to the handbook 667/HB/32921/007.</td><td>3</td></tr>
</table>

	DESCRIPTION AND REMARKS	
KLT	KLT <Sensor 1 to 96> : <Load type 0-255> **L**oad **T**ype for each lamp monitor sensor. Changing a KLT value will result in the fault "FLF 56:255 LMUC" being set to act as a warning. This fault will be cleared when a lamp monitor reset and relearn is requested using KLR=1. The currently defined types are shown in the table below. The types available depend on the controller type (i.e. the KLV value), the firmware issue and the version of the LED Signal; refer to the handbook 667/SU/46000/000 for version information. The setting applies to all colours monitored by that sensor. **IMPORTANT:** All signals monitored by a particular sensor must be of the same type, i.e. require the same KLT value. Do not fit different signal types on the same sensor. On a wide screen terminal device (see WID), this command also shows the phase and colours monitored by this sensor.	3

KLV and KLT Settings

KLT	(KLV<2) LV	(KLV:2) ELV-LED	(KLV>2) LV-LED	Signal Types
0	✓	✓	✓	Monitoring Disabled
1	×	✓	×	Siemens Helios ELV (inc CLS Wait)
	×	×	✓ (KLV=3/4)	Siemens / Dialight Helios CLS (NLM)
2	×	✓	×	Siemens LED Demand Indicator
3	×	✓	×	Siemens LED Near-Side Signals
4	×	✓	×	Siemens ELV LED Reg. Sign
5	×	✓	×	Siemens LED Wait
6	×	✓	×	AGD LED Near-Side Pedestrian (etc.)
7	×	✓	×	AGD LED Demand Indicator
8	×	✓	×	Siemens LED Low-Power Near-Sides
9	×	✓	×	AGD Wait Indicators
10	×	×	✓ (KLV=5/6/10)	Siemens / Futurit Helios CLS (NLM)
11	×	×	✓ (KLV=7/8/11)	230V SILUX 1.230d
	×	✓	×	40V SILUX 1.40d
12	×	×	✓ (KLV=12)	Hong Kong Panasonic 210mm LED Signals
13	×	×	✓ (KLV=13)	Hong Kong Panasonic 300mm LED Signals
14	×	×	✓ (KLV=12/13)	Hong Kong Panasonic Pedestrian LED Signals + Audibles
15	×	×	✓ (KLV=15)	Hong Kong Ketc 210mm LED Signals
16	×	×	✓ (KLV=16)	Hong Kong Ketc 300mm LED Signals
17	×	×	✓ (KLV=15/16)	Hong Kong Ketc Pedestrian LED Signals + Audibles
18	×	×	✓	Sagemcom DIOFIT WE D300
255	✓	×	✓	Original *

✓ Refer to the handbook 667/SU/46000/000 for compatible version information.

× Monitoring of these signal types on this controller type is not possible.

Notes:

- 'Original' includes HI lamps, Helios LED, Helios CLS+LMF and fluorescent tubes. Only this Load Type uses the IC4 configured 'Bulb Watts' value.
- If a sensor is configured to monitor both pedestrian Red and Wait with an "LED Lamp Switch" PCB, refer to the KRW handset command (below).

If the KLV handset command (page 132) is used to initialise all the KLT settings, the following rules are applied:

- KLV=3, KLV=5, KLV=7 – On-board sensors configured to monitor pedestrian Red and Wait are set up to monitor two incandescent Pedestrian Red Man Signals and two 40/60W Wait lamps. Other sensors are configured to monitor the selected LED signals shown in the table.
- KLV=4, KLV=6, KLV=8, KLV=10, KLV=11 – On-board sensors configured to monitor pedestrian Red and Wait are set up to monitor the LED signals shown in the table, but refer to the KRW command to see how Waits are handled.

	DESCRIPTION AND REMARKS	
KRW	KRW <Sensor 1 to 96> : <Enabled (1) or Auto (0)> Enables **R**ed and **W**ait monitoring when it is disabled by default on LV-CLS controllers. For a sensor configured to monitor both Pedestrian LED Red and Wait, two options are available: • 0: Auto – Monitoring of the Pedestrian LED Red is automatically suspended while the Wait indicator is illuminated on the assumption that the Wait indicator is not the same LED signal type as the Red. KES will display "CLS:R+W" while both the Red and Wait signals are illuminated to highlight that monitoring is suspended. As a result, the sensor only monitors the Pedestrian Red and Green and not the Wait. • 1: Enabled – Monitoring of the Pedestrian Red and Wait is enabled. The sensor monitors all the states and the LED Red and LED Wait signal types must be the same Load Type, i.e. require the same KLT setting, for example Helios CLS Red and CLS Wait. This setting can also be used where no load is connected to the Wait (Amber) drive monitored by this sensor. This setting has no effect on sensors that are not configured to monitor both LED Red and Wait. IMPORTANT: After changing these settings, request a lamp monitor reset and relearn. As a reminder, changing these settings will set the fault entry "FLF 56:255 LMUC", which will be automatically cleared by a Lamp Monitor Reset.	3
KSN	KSN : <Delay 0 to 255 (units of 20ms)> Delay between the aspect illuminating and lamp montoring starting to allow the current consumed by the aspect to settle after the initial surge. This setting only affects 'normal' signals. It has no effect on sensors monitoring flashing signals, fluorescent tube signals or those performing Red Lamp Monitoring or Last Lamp Monitoring. The value of zero selects the firmware default value, currently 1.5 seconds.	2

	DESCRIPTION AND REMARKS	
RLM	RLM <Stream 0 to 7> : <Number Of RLM Channels 0 to 4> Defines the number of **R**ed **L**amp **M**onitored channels on each stand-alone pedestrian stream, i.e. the number of lamp monitor sensors that perform Red Lamp Monitoring on the vehicle phase of that stream. 'RLM 0:2' and 'RLM 1:2' – Dual controller each with two channels. 'RLM 0:4' and 'RLM 1:0' – Single controller with four channels. This command is only available on stand-alone pedestrian streams and will only be accepted if the Signals On/Off Switch is in the OFF position. If the 'RLM' command is used to change the number of channels, the lamp monitor will be automatically reset in order to clear any old lamp faults and make it ready to learn the new lamp loads when the signals are switched back on. If the number of red lamp monitor channels is reduced, the sensors that are no longer used for red lamp monitoring will still perform normal lamp monitoring if loads are connected. So that the sensors performing red lamp monitoring can be easily identified, commands such as KEL will show the monitored colour as 'RLMRed' rather than 'Red'. If a sensor is disabled by the KLT command, the number of channels shown by the RLM command will be reduced accordingly. If 'RLM 1=0↵' is entered on a dual controller to set the number of RLM channels on the second stream to zero, the second stream is extinguished, but no fault is raised. This allows a dual configuration to be converted in to a single.	3

9.10 Last Lamp Monitoring Configuration Commands

Many of these commands refer to a Profile, numbered 0 to 7. Each 'Profile' defines how a sensor should monitor the signals, including the current threshold to be used, the confirm time and the fault actions. A Sensor is assigned to one Profile using the LLP handset command.

Each Profile has separate settings for each Colour:

- Where an index of Colour numbered 0 to 2 is specified, 0 = Red, 1 = Amber and 2 = Green.
- For Switched Signs, the colour of the phase output used by the sign determines which colour profile settings are used.
- For Wait indicators, the colour profile settings for Amber are used.
- For Regulatory Signs, the colour profile settings for Green are used.

	DESCRIPTION AND REMARKS	
LBD	LBD <Profile 0 to 7> <Colour 0 to 2> : <Voltage 0 to 299.99V> Last Lamp Monitoring Bright / Dim Voltage. For each Colour of each Profile a Bright threshold and a Dim threshold can be defined. This setting defines the voltage between these two thresholds – above this voltage the Bright threshold is used and below it the Dim threshold is used. Example: If the signals are required to be Bright above 200V and Dim below 180V, this setting should be 200V so the higher Bright Threshold is only used when all signals are Bright. Where the signals are never dimmed or the Bright Threshold is to be used throughout, this value can be set to zero and the Dim Threshold will never be used.	3
LIB LID	LIB <Profile 0 to 7> <Colour 0 to 2> : <Current 0 to 65535mA> LID <Profile 0 to 7> <Colour 0 to 2> : <Current 0 to 65535mA> Last Lamp Monitoring Constant Current Threshold. For each Colour of each Profile a Bright threshold and a Dim threshold can be defined. These setting define a constant current threshold intended to be used with constant current signals – signals with a current consumption that varies little with changes in the supply voltage. The Bright threshold is defined by LIB, LRB and LWB. If all three threshold values for a colour are zero, monitoring of that colour output is disabled above the LBD voltage. Enter one or more values to specify a threshold. When the current falls below this threshold, a fault is triggered. This allows a threshold to be defined that detects when the last lamp has failed. If two or three values are non-zero, the thresholds calculated from each value are summed and only when the current falls below this overall threshold is a fault logged. This allows a threshold to be programmed that is based partly on a constant power element and partly on a resistive power element for example. Similarly, the Dim threshold is defined by LID, LRD and LWD. If all three threshold values for a colour are zero, monitoring of that colour output is disabled below the LBD voltage.	3 3

	DESCRIPTION AND REMARKS	
LLA	LLA <Profile 0 to 7> <Colour 0 to 2> : <0 (No) or 1 (Yes)> Last Lamp Monitoring Fault Action. For each Colour of each Profile the Fault Action must be defined. 0 = Only a fault log entry is made when the last lamp fails. 1 = In addition the configured fault actions are also triggered, usually all signals are switched off or begin flashing (using the fail to part-time or HFF facilities).	3
LLC	LLC <Profile 0 to 7> <Colour 0 to 2> : <0 to 65535ms> Last Lamp Monitoring Confirm Time. For each Colour of each Profile a confirm time must be defined. This is the time between the current falling below the threshold and the fault actions (e.g. signals off). The value is in millisecond units. The maximum value permitted is 65535ms, equivalent to 65s. A value of zero disables monitoring on. Although permitted, a confirmation time below 300ms is not recommended because too few samples will be used to detect the fault. NOTE: If the last lamp fails shortly after the aspect switches on, the Confirm Time (LLC) starts at the end of the Delay Time (LLW).	3
LLO	LLO <Profile 0 to 7> <Colour 0 to 2> : <0 (No) or 1 (Yes)> Only Last Lamp Faults are to be reported. Each Colour of each Profile can be configured to only report Last Lamp faults, and suspend the reporting of individual lamp faults. 0 = Lamp faults (KLD) are reported when individual lamps fail, as well as when the last lamp fails. 1 = Individual lamp failures are not reported and faults are only reported when the last lamp fails.	3
LLP	LLP <Sensor 1 to 96> : <Profile 0 to 7, or 255 to disable> The Last Lamp Monitoring Profile (0-7) to be used by this Sensor. The 'Profile' defines how the sensor should monitor the signals, including the current threshold to be used, the confirm time and the fault actions. The value 255 disables Last Lamp Monitoring on the specified Lamp Monitoring Sensor. NOTE: If 'Red Lamp Monitoring' is configured, a 'Last Lamp Profile' can not be selected. This controller can not support both Red Lamp and Last Lamp Monitoring.	3
LLW	LLW <Profile 0 to 7> <Colour 0 to 2> : <0 to 65535ms> Last Lamp Monitoring Delay Time. For each Colour of each Profile a delay time can be defined. This is the time to wait after the aspect illuminates before monitoring is to commence. This is to allow time for the current readings to settle after the aspect is switched on. The value is in millisecond units. The maximum value permitted is 65535ms (65s), although such high values are unlikely to be required. For example, a value of 3000 will prevent monitoring of a three-second amber leaving signal. If this value is higher than the flash-on period, then monitoring will ignore flashing aspects.	3

	DESCRIPTION AND REMARKS	
LRB LRD	LRB <Profile 0 to 7> <Colour 0 to 2> : <Resistance 0 to 65535 ohms> LRD <Profile 0 to 7> <Colour 0 to 2> : <Resistance 0 to 65535 ohms> Last Lamp Monitoring Resistive Threshold. For each Colour of each Profile a Bright threshold and a Dim threshold can be defined. These setting define a threshold for use with incandescent lamps or any signal with a current consumption that increases as the supply voltage increases. Also see the description of LIB/LID. As a guide, 2000 Ohms defines a linear threshold that rises to approximately 25W at 230V.	3 3
LWB LWD	LWB <Profile 0 to 7> <Colour 0 to 2> : <Power 0 to 5999.9W> LWD <Profile 0 to 7> <Colour 0 to 2> : <Power 0 to 5999.9W> Last Lamp Monitoring Constant Power Threshold. For each Colour of each Profile, a Bright threshold and a Dim threshold can be defined. These setting define a constant power threshold intended to be used with constant power signals – signals with a power consumption that varies little with changes in the supply voltage. Also see the description of LIB/LID.	3 3

9.11 Last Lamp Monitoring Status Commands

	DESCRIPTION AND REMARKS	
KES	KES <Sensor 1 to 96> : <current> <phase/colour> **E**lectrical **S**ensor displays the current being read in milliamps, and if possible, which phase and colour this applies to – see page 123.	R
KLD	KLD <Sensor 1 to 96> <Aspect 0 to 6> : <watts> <phase/colour> **L**amp **L**oad **D**ropped shows any active lamp faults – see page 124. Both normal lamp faults and Last Lamp are visible using KLD. Example: With 40W learnt, KLD will indicate that all 40W have failed when a Last Lamp fault is confirmed.	3

	DESCRIPTION AND REMARKS	
LLE	LLE <Sensor 1 to 96> <Colour 0 to 5> : <0 (No) or 1 (Yes) Indicates whether Last Lamp Errors have been detected. Indicates whether Last Lamp Faults, including Last Lamp Testing faults, have been confirmed as follows: LLE <S> 0 – Last Lamp Faults – Red LLE <S> 1 – Last Lamp Faults – Amber LLE <S> 2 – Last Lamp Faults – Green LLE <S> 3 – Last Lamp Testing Errors – Red LLE <S> 4 – Last Lamp Testing Errors – Amber LLE <S> 5 – Last Lamp Testing Errors – Green Last Lamp Faults (0-2) shows the same status information as LLF, but arranged in Colour (0-2) order, rather than Aspect Pattern (0-6) order. Last Lamp Test Errors (3-5) could indicate: • Equipment failures. • Configuration errors, such as the sensor type does not match the outputs monitored by the physical sensor.	R
LLF	LLF <Sensor 1 to 96> <Aspect 0 to 6> : <0 (No) or 1 (Yes) Indicates whether Last Lamp Faults have been detected. Can be used to determine if the lamp fault indicated by KLD was confirmed by the Last Lamp facility. Uses the same index values as KLD.	R
LLS	LLP <Sensor 1 to 96> : <Colour State> The colour state of the Last Lamp Sensor. Indicates the colour of signal being monitored by the sensor: 0=Red, 1=Amber or 2=Green. The value 3 indicates that monitoring is disabled or suspended. This may be because monitoring is disabled by the configuration settings or that the phase monitored has more than one colour illuminated. The values 4 (Red), 5 (Amber) and 6 (Green) indicate monitoring of the colour is not required. For example ‘6’ indicates that the phase is at Green, but the sensor is not configured to monitor any Green LSLS Outputs; the sensor may only be configured to monitor a Red LSLS Output.	R
LLT	LLT <Sensor 1 to 96> : <Threshold in use> Displays the threshold actually being used. The threshold value shown is in milliamps, and is calculated from the various settings in the profile, some of which depend on the lamp supply voltage. Note: This information is only updated periodically and gives a snapshot of the threshold being used, which may vary with the lamp supply voltage.	R

9.12 Miscellaneous LMU Commands

The following Lamp Monitoring handset commands are also available, but should not be needed during normal commissioning or maintenance operations.

	DESCRIPTION AND REMARKS	
KLE	KLE : <Enabled (1) or Disabled (0)> **L**amp monitoring **E**nabled indicates whether the lamp monitor has been enabled or disabled. **CAUTION:** Disabling the lamp monitor will generate second red lamp failures if red lamp monitoring is configured and thus may extinguish all the signals on the street.	3
KAS	KAS <Sensor 1 to 96> <Aspect 0 to 6> : <Binary> **A**spect **S**tatus for the sensor and aspect. Each bit set to '1' signifies: 00000001 – Waiting to learn the aspect in the dimmed state 00000010 – Waiting to learn the aspect in the bright state 00000100 – Waiting to see the aspect for the first time 00001000 – Waiting for a dim/bright change-over 00010000 – Confirming a load change (or initial learning) 00100000 – Confirming a dim/bright change	R
KLL	KLL <Learn Status Type 0-3> : <0 or 1> Learnt Status displays the individual learnt status for each of the 4 least significant bits from the KLS command. For example, "KLS 00001110" is reproduced as "KLL 0:0", KLL 1:1", "KLL 2:1" and "KLL 3:1".	R
KLS	KLS : <Binary> **L**earn **S**tatus displays the overall learnt status, i.e. the combined display from all the KAS displays (right most 4 bits only).	R
KLM	KLM : <State 6, 7 or 8> **L**a**M**p state shows the lamp supply state confirmed by the lamp monitor, where 6=lamps off, 7=lamps on, and 8=change being confirmed.	R
KPL	KPL <Sensor 1 to 96> <Aspect 0 to 6> : <Percentage 0 to 100, 255> **P**ercentage **L**earnt displays the progress of lamp load learning for the specified sensor and aspect. A value of 255 is displayed for any sensor/aspect that is not configured to be monitored. The same information is also available using the KEL and KML commands.	R
KRS	KRS : <Status 0 or 1> Lamp monitor **R**eset **S**tatus. Displays whether the lamp monitor reset command (KLR) will be accepted. 0 = Full lamp monitor reset/relearn KLR disabled, use KRD first. 1 = Full lamp monitor reset/relearn KLR enabled.	R

	DESCRIPTION AND REMARKS	
KSS	KSS <Sensor 1 to 96> : <Status> **S**ensor **S**tatus. Output for a sensor varies according to the prevailing conditions in the controller. “KLE0” = Lamp monitoring is disabled. “LampsOff” = Supply voltage OFF or very low. “KLT0” = Monitoring for this sensor has been explicitly disabled. “RLM0”= No readings available. Sensor has been configured to monitor a pedestrian phase which is disabled by the RLM command. “Suspend” = No readings available. Monitoring with this sensor has been suspended. “HiLoKEV” = Suspended because voltage is outside of acceptable range. “CLSRW” = Monitoring of an LED Red and Wait is to be ignored on an LV CLS. “NotMon” = Monitoring has been disabled i.e. KLT n=255. If not one of the above, the KSS output for a given sensor is the colour code (1 to 34) of the monitored phase/switched sign/wait indicator etc. 1 = Red — 2 = Amber 3 = Flashing Amber — 4 = Green 7 = Wait indicator — 8 = Red man or wait indicator 9 = Failure when wait indicator off — 10 = Regulatory sign 11 = Switched sign on — 12 = Switched sign on (red) 13 = Switched sign on (amber) — 14 = Switched sign on (green) 15 = Switched sign off — 16 = Switched sign off (red) 17 = Switched sign off (amber) — 18 = Switched sign off (green) 31 = Flashing red — 32 = Flashing green 33 = Green and flashing amber — 34 = RLM red	R
KTE	KTE : <Options 0 to 5> **T**race **E**nable controls whether diagnostic trace records (see KTR) are recorded. The following options are available. KTE=0 – No trace records are created; logging disabled. KTE=1 – Trace records are always created; permanent enable. KTE=3 (default) – Trace records are created until any lamp failure is confirmed so that the operation of the lamp monitor just prior to the failure is captured. Logging is suspended while any lamp fault is present. The logging automatically resumes when the lamp fault is cleared. KTE=5 – Same as KTE=3, except that logging does not automatically resume when the fault is cleared to help investigate intermittent faults for example.	2

	DESCRIPTION AND REMARKS	

KTR	KTR <Sensor 1 to 96> <Record 0 to 49> : <Information>
	A new record is created for a sensor whenever the current, learnt load or phase/colour (aspect number) changes significantly.
	Each **T**race **R**ecord shows the following information, with an example below.
	`KTR ss rr:Aa *day hh:mm:ss iiiimA vvvV wwwWxy P/Col`
	`KTR 2 0:A0 *Mon 12:00:00 1124mA 240V 270WB? B/Red`
	The content of each shaded 'field' is described below.
	`Ss`..... Sensor number. The records for each sensor are kept separate. Type "KTR 2↵" to start viewing the records for sensor 2 for example.
	`Rr`..... Record number. Information is first stored in record 0, then record 1, etc. When record 49 has been used, the contents of record 0 (etc.) are overwritten with more recent data. To get the whole history for a sensor, scroll through all 50 (0-49) records and then use the timestamp fields (or asterisk if available) to locate the most recent record.
	`Aa`..... Aspect Pattern number being monitored by the sensor, i.e. the colour being monitored. Refer to section 9.2 for more information.
	`*`..... An asterisk marks the most recent record.
	`day hh:mm:ss`…The day of the week and time of day when the record was created.
	`Suspended, KTE:n`…If this is logged instead of the following measurements, logging was suspended by the KTE value, e.g. while a lamp fault is logged.
	`i`mA... The current measured in milliamps (see KES).
	`v`V..... The lamp supply measured in volts (see KEV). ELV voltages may be displayed without a decimal point, e.g. "481V" for 48.1V
	`w`W..... The learnt load in watts (see KEL).
	`x`..... The Dim/Bright learnt state. "WD" or "WB" indicates that the learnt load was learnt in either Dim or Bright as appropriate. "W?" indicates that the dim/bright state has not yet been confirmed.
	`y`..... This flag displays '?' while the controller is learning or confirming any change (see KAS), e.g. "100WB?" indicates that the controller had learnt the load as 100W in Bright, but is currently confirming a change. When the change is confirmed, a new record will be created showing the new learnt load.
	`P/Col`…Displays the phase and colour monitored by the sensor and aspect pattern (if applicable).
	Also refer to the KTE command, which enables/disables logging.
		R

10 DELETED / REDUNDANT FACILITIES AND COMMANDS

This section describes why certain handset commands used by previous generations of the Siemens traffic controller (T400, ST800, ST900) have been deleted and, where relevant, which new commands have replaced them. It also lists those commands that should not be required any more, but have been kept for backwards compatibility.

10.1 Old Fault Commands

	DESCRIPTION AND REMARKS	
FLF	FLF <Fault Flag 0 to 63> : <Value 0 to 255> View the specified **F**ault **L**og **F**lag. Normal response would be a value of zero for no fault, or a number other than zero when a fault is present. The commands FLF and FLD have been effectively replaced by FFS and FDS; see section 4 starting on page 26.	R
FLD	FLD <Fault Data 0 to 249> : <Value 00000000 to 11111111> View the specified **F**ault **L**og **D**ata byte; see FLF above.	R
FLT	FLT <Fault Flag 0 to 63> : <Week Number, Day and Time> **F**au**L**t **T**ime displays the time of day of when the specified fault flag was last set (even if it has subsequently been cleared). The time that faults became set is also recorded in the System Log making this command virtually redundant.	R
~~LOG~~	LOG deleted. The controller's historic rolling log is now part of the System Log.	R

10.2 Old Real Time Clock Commands

	DESCRIPTION AND REMARKS	
STM	STM 0 : <0 (Sat) to 6 (Fri)> STM 1 : <0 to 23 hours> STM 2 : <0 to 59 minutes> STM 3 : <0 to 59 seconds> STM 4 : <1 to 31 day of month, or 0> STM 5 : <1 to 12 month number, or 0> STM 6 : <0 to 99 year> **S**et **T**i**M**e can still be used on the controller to set-up the time and day of week before entering 'CKL=1' as on the T400, although it is much easier to simply enter the date and time directly using TOD, see page 82. STM has been extended to also allow the date to be set-up. However, if either the 'day of month' or the 'month' fields are '0', the date is not changed in case the operator failed to notice these extra entries.	2

	DESCRIPTION AND REMARKS	
CKL	CKL : <1> Request **C**loc**K L**oad can still be used with STM to set the clock, although it is much easier to simply enter the date and time directly using TOD, see page 82.	2
DAY	DAY : <0 to 6> Views the controller's current **DAY** of week value. TOD now displays the time, the date and the day of the week. 0 = Saturday, 1 = Sunday, … , 6 = Friday	R
~~WEK~~	WEK : <Week Number: 1 to 52> Deleted. The ST950 does not use week numbers.	-
~~CKA~~ ~~CKR~~	CKA : <Date 0 to 31> <Month JAN to DEC> <Year 00 to 99> CKR : <Date 0 to 31> <Month JAN to DEC> <Year 00 to 99> Deleted. The daylight saving settings are available on the web page user interface and affect all the software applications running on the ST950.	-
~~BSA~~ ~~BSR~~	BSA : <Week Number: 1 to 52, or 0> BSR : <Week Number: 1 to 52, or 0> Deleted. The daylight saving settings are available on the web page user interface and affect all the software applications running on the ST950.	-
~~CKS~~ ~~CKM~~	CKS: <Clock synchronisation time> CKM: <GPS clock message> Deleted. The GPS clock synchronisation settings are available on the web page user interface and affect all the software applications running on the ST950.	-

10.3 ST900 Miscellaneous Commands

	DESCRIPTION AND REMARKS	
~~CFG~~	CFG deleted. On-Street Configuration feature not supported.	-
~~CNN~~ ~~LRN~~ ~~TKE~~	CNN, LRN, TKE deleted. These initialisation commands are not required on the ST950. To load a new configuration, use the WIZ handset command or the web page user interface.	-
~~ENC~~	ENC deleted. Displayed the contents of the configuration PROM.	-
~~ENM~~	ENM deleted. Displayed the contents of the shared RAM on the integral OMU card (also known as the IMU or IRM).	-
~~ENO~~	ENO deleted. Displayed the contents of the shared RAM on the integral OTU card.	-

	DESCRIPTION AND REMARKS	
~~ENR~~	ENR deleted. Displayed the contents of the working RAM.	-
~~ENS~~	ENS deleted. Displayed the contents of the shared RAM on the SDE/SA card.	-
~~FRE~~	FRE deleted. The processor load of the EFC (which includes the Controller Application) can be seen on the Status-System web page and with the 'cpuload' command.	-
~~OMF~~	OMF deleted. The ST950 does not support this card, also known as the IMU, IRM or integral facilities processor.	-
~~OTF~~	OTF deleted. The ST950 does not support the Integral OTU card.	-
~~OTO~~	OTO deleted. The ST950 does not support the Integral OTU card.	-
PSA	PSA <Unit Number 0 to 7> <Phase A to F2> : <Allow(1) or Inhibit(0)> **P**riority **S**trategy: **A**llowed demands, i.e. if set non-zero, a VA demand for the phase is allowed when the unit is making its priority moves. This legacy command has effectively been replaced by PSS (page 108).	2
PSE	PSE <Unit Number 0 to 7> <Phase A to F2> : <Enforce(1) or Inhibit(0)> **P**riority **S**trategy: **E**nforced demands, i.e. if set non-zero, a demand is introduced for the phase when the unit is making its priority moves. This legacy command has effectively been replaced by PSS (page 108).	2
PUI	PUI <Unit Number 0 to 7> : <00 to FF> **P**riority **U**nits **I**nhibited after the priority unit's phase has gained right of way. This legacy command encodes the eight priority units using two hexadecimal digits, four units encoded by each digit: PUI 3:E8 UNITS: 7 6 5 4 | 3 2 1 0 0 – – – – | – – – – 1 – – – YES | – – – YES 2 – – YES – | – – YES – 3 – – YES YES | – – YES YES 4 – YES – – | – YES – – 5 – YES – YES | – YES – YES 6 – YES YES – | – YES YES – 7 – YES YES YES | – YES YES YES 8 YES – – – | YES – – – 9 YES – – YES | YES – – YES A YES – YES – | YES – YES – B YES – YES YES | YES – YES YES C YES YES – – | YES YES – – D YES YES – YES | YES YES – YES E YES YES YES – | YES YES YES – F YES YES YES YES | YES YES YES YES In the above example, '`PUI 3:E8`' means that priority unit 3 inhibits units 7, 6, 5, and 3. Replaced by the command PUN (page 109).	2
~~SAC~~	SAC deleted. On-Street Configuration feature not supported.	-

10.4 T400 Pelican Handset Commands

	DESCRIPTION AND REMARKS	
~~FIO~~	FIO <Index 0 to 139> : <I/O Line 0 to 95 or 255(disable)> The **F**unction **I**nput/**O**utput allocation command - use IOA (page 72)	2
~~FVA~~	FVA <Stream 0 to 3> : <20 to 60 seconds> **F**ixed **V**ehicle Period Time Sets **A** to **D** – use MEX etc. (page 102)	2
~~HKD~~	HKD <Stream 0 to 3> : <1.0 to 2.0 seconds> **H**old **K**erbside **D**etector handset command – use IPX (page 96)	2
~~HPB~~	HPB <Stream 0 to 3> : <1.0 to 2.0 seconds> **H**old **P**ush **B**utton handset command – use IPX (page 96)	2
~~PGT~~	PGT <Stream 0 to 3> : <3 to 15 seconds> **P**edestrian **G**reen **T**ime handset command – use MIN (page 93).	3
~~SAS~~	SAS < Stream 0 to 3> : <No. of SDE/SA assessors being used 0 to 15> Number of **S**DE/SA **As**sessors – see section 6.7 (page 77).	3
~~VAD~~	VAD <Stream 0 to 3> : <0 to 4> **VA** mode **D**isable – use PEV (page 102) and PTM (page 102)	3
~~VAE~~	VAE <Stream 0 to 3> : <0 to 4seconds> Pelican **VA** Green **E**xtension time – use EXT or IPX (page 102)	2
~~VAM~~	VAM <Stream 0 to 3> : <6 to 15> Pelican **VA** Green **M**inimum time – use MIN (page 93).	3
~~VAX~~	VAX <Stream 0 to 3> : <10 to 60 seconds> Pelican **VA** Green Ma**X**imum time – use MAX (page 102)	2
~~WTI~~	WTI <Demand Source 0 to 4> : <Value 0 to 1> Deleted. Special Conditioning is required if the wait indicator should not be illuminated with certain demand sources.	2

10.5 T400 Cableless Link Facility Commands

	DESCRIPTION AND REMARKS	
~~IFA~~ to ~~IFD~~	IFA <CLF Inf. Set 0 to 7> <CLF Group 0 to 31> : <Function & Stage> The four T400 influence sets IFA to IFD are no longer provided. The controller now automatically determines which IFN influences affect which streams from the IFS value.	2

~~PRS~~	PRS : <Enable (1) or Disable (0) Automatic **P**lan **R**e-entry **S**witch allowed the CLF group times to be altered and then, after the delay set by PRD had expired automatically, re-introduced the current plan. Since group times now specify offsets in a separately configured cycle time, there is no need for this facility and thus these two commands have been deleted.	2
~~PRD~~	PRD <Time Part 0 to 1> : <0 to 255 seconds/minutes> Deleted, see PRS.	2

10.6 T400 Timing Commands

	DESCRIPTION AND REMARKS	
AMX	AMX <Phase A to F2> : <0 to 255 seconds> **A**lternate **M**a**X**imum green time accesses the same information as MBX.	2
~~DMV~~	DMV <Delay Number 0 to 59> : <00 to FF – Stage Movement> Phase **D**elay **M**o**V**ement commands had to be modified to allow stage numbers up to 31 to be specified - use DMF and DMT (page 99).	2
~~LMX~~	LMX <Stream 0 to 7> : <0 to 255 seconds> **L**MU **M**a**X**imum all red time was introduced by a 2nd red lamp fail pending signal from the LMU unit. Red lamp monitoring is now fully built-in and does not require a 2nd red lamp fail pending signal - use RLT.	2
PIR	PIR <Timer Number 0 to 479> : <0 to 255 or 0.0 to 31.8 seconds> **P**edestrian **I**nhibit **R**elease times accesses the same information as CDT, i.e. the special conditioning timer values – see page 100.	2
~~SIE~~	SIE <Stream 0 to 7> : <0.0 to 31.8 seconds> **S**upplementary **I**ntergreen **E**xtension time defined the all red period due to 1st red lamp fail signal from the LMU unit. Red lamp monitoring is now fully built-in and uses RLT to specify delays between phases on a 1st red lamp failure - use RLT.	2

10.7 T400 Status Commands

	DESCRIPTION AND REMARKS	
CST	CST <Stream 0 to 7> : <0 to 31 Current Stage> Displays the **C**urrent **St**age on each stream or the next stage during a stage movement. The handset command STS displays the status of each stream, which includes displaying the current stage or the previous and next stage during a stage movement.	R

	DESCRIPTION AND REMARKS	
MOD	MOD <Stream 0 to 7> : <Mode Number> Displays the current operating **MOD**e on each stream as a decimal number: 0 = Not Used, 1 = Fixed Time, 2 = VA, 3 = CLF, 4 = Manual, 5 = Hurry Call, 6 = UTC, 7 = Part Time, 8 = Start Up, 9 = Pedestrian FVP mode, 10 = Manual Step-On, 11 = Not Used, 12 = Emergency Vehicle, 13 = Priority Vehicle, 14 = Pedestrian VA mode, 15 = Not Used, 16 = MOVA*, 17 = LRT mode*. (* See MVU on page 111) The handset command STS displays the status of each stream, which includes displaying the current mode as text.	R
STA	STA : <Status Information> Displays **STA**tus information on the first 16 phases and was used by a Ferranti OMU connected to the controller's 141 port.	R

10.8 T400 Miscellaneous Commands

	DESCRIPTION AND REMARKS	
~~DFD~~	DFD : <1 to 255 hours, 0 = 1 minute> **D**etector **F**ault monitoring **D**elay set the single DFM time for the old DFM facility. The new DFM facility assigns detectors to one of up to eight DFM groups and allows alternate timesets, see DSA and DSI.	2
~~KAC~~	KAC <Sensor 1 to 23> <0=current, 1=voltage> : <value> This handset command displays the ADC counts for the current or the voltage of the given sensor, replaced by KES and KEV.	R
~~KLP~~	KLP <Sensor 1 to 23> <Aspect 0 to 6> : <Text> This handset command displays lamp faults with phase information, replaced by KLD.	R

11 HANDSET COMMAND SUMMARY

This table lists all the commands available with a short description.
Note: Ranges show the maximum range permitted. The actual range available may be reduced by configuration data.

CODE – Handset command mnemonics. Those shown with a ~~strikethrough~~ are not supported by this controller. More information may also be available in section 10 starting on page 143.

INDEX – Optional indices (see the key below)

DATA – Value range for read/write commands.

A – Access level required to change values: O=Open, RO=Read-Only, **L2**=Level 2, **L3**=Level 3

WEB PAGE – identifies the specific 'Status and Configuration' Controller web page where the value accessed by the handset mnemonic also appears. (Comments in brackets indicate that the information is available via a top-level web page, e.g. the Fault Table)

The following definitions are used within the INDEX and DATA columns and their values are expanded as follows.

- ASPECT = 0-7 (Lamp Monitor Aspect Pattern).
- ASS'SOR = 0-15 (SDE/SA assessor).
- DELAY = 0-119 (Phase Delay).
- DFMGRP = 0-7 (DFM group).
- DFMTSET = 0-7 (DFM time set).
- FLF = 0-63.
- HRYUNIT = 0-7 (Hurry call unit).
- IGDELAY = 0-63 (Intergreen delay).
- INFSET = 0-15 (Influence set).
- IOLINE = 0-247.
- IOPORT = 0-30.
- LRTTSET = A-H (LRT time set).
- LRTUNIT = 0-15 (LRT unit).
- PHASE = One of A,B, … ,E2,F2.
- PLAN = 0-15 (Cableless Linking Facility Plan).
- PRIUNIT = 0-7 (Priority unit).
- PRITSET = 0-3 (Priority time set).
- SENSOR = 1-96 (Lamp Monitor Sensor Number).
- STAGE = 0-31.
- STREAM = 0-7.

CODE	INDEX1	INDEX2	DATA	A	DESCRIPTION	WEB PAGE
ADF	-	-	1	L2	Accept Detector Fault(s)	Faults
AFZ	-	-	-	RO	Arterial Reversion (Phases)	-
AM1	STAGE	STAGE	-	RO	Alt Move Set 1	-
AM2	STAGE	STAGE	-	RO	Alt Move Set 2	-
AMX	PHASE	-	0-255	L2	Second Max Period (same as MBX)	Phases- Times
AST	STREAM	-	-	RO	Arterial Reversion (Stage)	-
BAS	-	-	0-3	O	Select Memory Display Base	-
~~BSA~~	-	-	-		(Reserved by PB800/PB801)	-
~~BSR~~	-	-	-		(Reserved by PB800/PB801)	-
CCI	STREAM	-	-	RO	UTC Active	-
CCP	-	-	1	L2	Restore CLF Operation	CLF- CLF Status
CCT	-	-	-	RO	Current CLF Cycle Time	CLF- CLF Status
CDT	0-479	-	0-255, 0-31.8	L2	Conditioning Timers	Special Conditioning- Timers
CDY	PHASE	0-1	0-255	L3	Pedestrian Clearance Delay	Pedestrian- Phase
CFE	0-63	-	0-1	L3	Conditioning Facility Enables	Special Conditioning- Facilities
CFF	0-1023	-	0-1	L2	Conditioning Facility Flags	-
~~CFG~~	-	-	-		(Reserved by PB800/PB801)	-
CFZ	PHASE	-	-	RO	Conflicting Phases	-
CGR	STREAM	-	-	RO	Current CLF Group	CLF- Groups
CGT	STREAM	-	-	RO	Current CLF Group Time	CLF- Groups
CIC	-	-	-	RO	Configuration Identity Code	IC4 Config
CID	-	-	-	RO	Firmware Version Desired By IC4	IC4 Config
~~CIE~~	-	-	-		(Reserved by PB800/PB801)	-
CIL	-	-	0-1	L2	Crossing-Inhibit Linking	Pedestrian- Standalone
~~CKA~~	-	-	-		(Reserved by PB800/PB801)	-
CKL	-	-	1	L2	Load Master Time Clock	Clocks
~~CKM~~	-	-	-		(Reserved by PB800/PB801)	-
~~CKR~~	-	-	-		(Reserved by PB800/PB801)	-
~~CKS~~	-	-	-		(Reserved by PB800/PB801)	-
CMX	PHASE	-	0-255	L3	Pedestrian Clearance Max Time	Pedestrian- Phase
~~CNN~~	-	-	-		(Reserved by PB800/PB801)	-
CPL	-	-	-	RO	current plan	CLF- Status
~~CPT~~	-	-	-		(Reserved by PB800/PB801)	-
CRC	-	-	-	RO	Eight Digit Checksum	IC4 Config
CRD	PHASE	-	0-255	L3	Pedestrian Clearance Red Period	Pedestrian- Phase
CSS	-	-	1-2	L2	CLF Step Size	CLF- Status
CST	STREAM	-	-	RO	Current Stage In Stream	Phases- Status
CTS	-	-	0-2	L2	Controller Clock Timing Source	Clocks
CUD	0-7	-	IOLINE, 255	L2	Assign U/D Unit to an Input Line	I/O- U/D
CYC	PLAN	-	0-255	L2	CLF Plan Cycle Time	CLF- Plans
DAY	-	-	-	RO	Controller Clock Day Of Week	Clocks
DBG	-	-	-	L3	Reserved For Engineering Use Only	-
DCL	0-7	-	0-255	L2	Detector Call Delay Period	Call/Cancel
DCN	0-7	-	0-255	L2	Detector Cancel Delay Period	Call/Cancel
DET	IOLINE	-	0-2,99	L2	Override Detector Setting	I/O- Lines
DFA	IOLINE	-	0-2	L2	Detector Fault Action	I/O- Faults
~~DFD~~	-	-	-		(Use DSA/DSI)	-
DFS	IOLINE	-	0-1	L2	DFM Suspend (Disable/Enable)	I/O- Faults
DFZ	DELAY	-	PHASE	L2	Phase To Be Delayed	Phase Delay
DGP	IOLINE	-	DFMGRP	L2	Assign Input Line to a DFM Group	I/O- Faults
DHC	HRYUNIT	-	0-255	L2	Hurry Call Delay Period	Hurry Call
DIT	-	-	0-1	L2	Dimming Type	Supply
DLP	15-40	-	15-40	L2	Dimming Level	
DMF	DELAY	-	STAGE	L2	Phase Delay Move From Stage	Phase Delay
DMT	DELAY	-	STAGE	L2	Phase Delay Move To Stage	Phase Delay
~~DMV~~	-	-	-		(Use DMF/DMT)	-
DOV	-	-	0-1	L2	Dim Override (Force Bright)	Supply

CODE	INDEX1	INDEX2	DATA	A	DESCRIPTION	WEB PAGE
DPG	DELAY	-	0-255	L2	Phase Delay Period	Phase Delay
DSA	DFMGRP	DFMTSET	0-255	L2	DFM Time To Active Failure	I/O- DFM Groups
DSF	IOLINE	-	-	RO	Detector State On DFM Failure	I/O- Lines and I/O- Faults
DSI	DFMGRP	DFMTSET	0-255	L2	DFM Set Time To Inactive Failure	I/O- DFM Groups
DTO	-	-	0-1	L2	DFM Time Override	-
ELV	-	-	YES, NO	RO	Extra Low Voltage Setting	-
~~ENC~~	-	-	-		(Reserved by PB800/PB801)	-
ENG	CODE	OFFSET	-	RO	Display Engineering Code Memory	-
~~ENM~~	-	-	-		(Reserved by PB800/PB801)	-
~~ENO~~	-	-	-		(Reserved by PB800/PB801)	-
~~ENR~~	-	-	-		(Reserved by PB800/PB801)	-
~~ENS~~	-	-	-		(Reserved by PB800/PB801)	-
EXT	PHASE	-	0.0-31.8	L2	Phase Extension Period	Phases- Times
FAC	0-59	-	-	RO	Facilities Table	-
FAZ	-	-	-	RO	Number Of Phases	-
FDS	0-249	-	-	RO	Fault Data Scan	(System Log)
FFS	FLF	-	-	RO	Fault Flag Scan	(Fault Table & System Log)
FFZ	STAGE	-	-	RO	Fixed Phases In The Stage	-
FIO	-	-	-	RO	Use IOA	-
FIX	STAGE	-	0-255	L2	Fixed Time Stage Period	Fixed Time- Standard
FLD	0-249	-	-	RO	Fault Log Data	System Log
FLF	FLF	-	-	RO	Fault Log Flag	(Fault Table & System Log)
FLT	FLF	-	-	RO	Fault Log Time	(System Log)
~~FRE~~	-	-	-		(Reserved by PB800/PB801)	-
FTS	STAGE	-	-	RO	Fixed Time Sequence	Fixed Time- Standard
~~FVA~~	-	-	-		(Use MEX, MFX, MGX, MHX)	-
FZA	PHASE	-	-	RO	Associated Phase	-
FZC	PHASE	-	-	RO	Current Phase Colour (RAG)	Phases- Status
FZD	PHASE	-	-	RO	Phase Demand Detected	Phases- Status
FZE	PHASE	-	-	RO	Phase Extension Timer Active	Phases- Status
FZH	PHASE	-	(TEXT)	RO	Phase Hardware States	(Site UI)
FZI	PHASE	-	-	RO	Inhibited by RLM	Phases- Status
FZL	PHASE	-	-	RO	Phase Leaving Type	-
FZM	PHASE	-	-	RO	Phase Minimum Green Timer Value	Phases- Status
FZQ	PHASE	-	-	RO	Phase Sequence Timer Active	Phases- Status
FZT	PHASE	-	-	RO	Phase Type	-
FZX	PHASE	-	-	RO	Phase Maximum Green Timer Value	Phases- Status
FZY	PHASE	-	-	RO	Phase Delay Timer Value	Phases- Status
HHC	HRYUNIT	-	0-255	L2	Hurry Call Hold Period	Hurry Call
~~HKD~~	-	-	-		(Use IPX)	-
~~HPB~~	-	-	-		(Use IPX)	-
IDA	IOLINE	-	-	RO	DFM Accepted Faults	I/O- Faults
IDG	IGDELAY	-	-	RO	Intergreen Delay Gaining Row Phases	Phases- Intergreen Delays
IDI	PHASE	-	-	RO	Intergreen Delay Phase Inhibited	Phases- Status
IDL	IGDELAY	-	-	RO	Intergreen Delay Losing Row Phase	Phases- Intergreen Delays
IDP	IGDELAY	-	0-255	L3	Intergreen Delay Maximum I/G Period	Phases- Intergreen Delays
~~IFx~~	-	-	-		(Use IFN/IFS; x = A to D)	-
IFN	INFSET	GROUP	0-9, 255	L2	Group Influence Function Code	CLF- Influences
IFS	INFSET	GROUP	STAGE, 255	L2	Group Influence Affected Stage	CLF- Influences
IGN	PHASE	PHASE	0-199	L3	Phase Intergreen Period	Phases- Intergreen…
IGS	-	-	0-255	L3	Starting Intergreen Period	Stages- Settings
~~IMU~~	-	-	-		(Reserved by PB800/PB801)	-
IOA	IOLINE	-	IOLINE, 254, 255	L3	I/O Line Re-Allocation	I/O- Allocation
IOB	0-15	-	0-1	L2	I/O Board 0-15 Required (If 1)	I/O- Cards
IOC	IOLINE	-	-	RO	IO Line Positive Transitions Count	I/O- Lines
IOD	IOLINE	-	-	RO	IO Line Card Address	I/O- Lines
IOE	IOLINE	-	-	RO	Position Of IO Line On IO Card	I/O- Lines
IOF	IOLINE	-	-	RO	IO Line On A Faulty IO Card	I/O- Lines

CODE	INDEX1	INDEX2	DATA	A	DESCRIPTION	WEB PAGE
IOI	IOLINE	-	-	RO	IO Line Direction	I/O- Lines
IOL	IOPORT	-	-	RO	Logical I/O Port Status	I/O- Ports
ION	IOLINE	-	-	RO	IO Line Name	I/O- Lines
IOP	IOPORT	-	-	RO	I/O Port Status (Physical)	I/O- Ports
IOR	IOLINE	-	-	RO	Review Logical Functions On Physical I/O Line	I/O- Allocation
IOV	IOLINE	-	-	RO	IO Line Value	I/O- Lines
IOY	IOLINE	-	-	RO	IO Line Physical Line Number	-
IPS	IOLINE	-	0-1	L2	I/O Line Sense:0=Norm,1=Inverted	I/O- Lines
IPX	IOLINE	-	0.0-31.8	L3	Input Extension Times	I/O- Lines
ITV	PHASE	PHASE	-	RO	Intergreen Threshold Value	Phases- Intergreen
~~KAC~~	-	-	-		(Use KES/KEL)	-
KAS	SENSOR	ASPECT	-	RO	LMU Aspect Status Flags	LMU- Readings
KDB	-	-	-	RO	LMU Confirmed Dim/Bright State	Supply LMU- General
KDL	-	-	0-255	L2	LMU Dim/Bright Limit	Supply
KDP	-	-	0-2	L2	LMU Dim/Bright Present	LMU- General
KEA	SENSOR	ASPECT	-	RO	Colour associated with aspect	LMU- Readings
KEL	SENSOR	ASPECT	-	RO	LMU Learnt Load	LMU- Readings
KEP	SENSOR	-	-	RO	Phase associated with sensor	LMU- Readings
KES	SENSOR	-	-	RO	LMU Current Sensor Reading	LMU- Readings
KEV	-	-	0-255	L3	LMU Lamp Supply Voltage	Supply
KLC	-	-	1-255	L2	Lamp Fault Confirm Time	LMU- General
KLD	SENSOR	ASPECT	0	L3	LMU Load Dropped	LMU- Readings
KLE	-	-	0-1	L3	LMU Enable	LMU- General
KLL	0-3	-	-	RO	LMU Learn Status	LMU- Reset/Learning
KLM	-	-	-	RO	LMU Confirmed Supply State	-
~~KLP~~	-	-	-		(Use KLD)	-
KLR	-	-	1	L3	LMU Reset	LMU- Reset/Learning
KLS	-	-	-	RO	LMU Learn Status	LMU- Reset/Learning
KLT	SENSOR	-	0-255	L3	LMU Load Type	LMU- Sensors
KLV	-	-	0-3	L3	Lamp Supply Voltage Type	Supply LMU- General
KML	-	-	0-1	L3	LMU Monitor Learning	LMU- Reset/Learning LMU- Readings
~~KNL~~	-	-	-		(Reserved by PB800/PB801)	-
KPC	SENSOR	ASPECT	-	RO	Phase and Colour to be monitored	(System- Export Site Info)
KPL	SENSOR	-	-	RO	LMU Percentage Learnt	LMU- Readings
KPT	SENSOR	-	-	RO	Sensor (Phase) Type	LMU- Sensor
KPU	-	-	-	L2	Power-Up Counts – Use System Log	(System Log)
KRD	-	-	1	L3	Red Lamp Fault Delete	LMU- RLM Faults
~~KRM~~	-	-	-		(Reserved by PB800/PB801)	-
KRS	-	-	-	RO	KLR Inhibit Status	LMU- Reset/Learning
~~KRT~~	-	-	-		(Reserved by PB800/PB801)	-
KRW	SENSOR	-	0-1	L3	Enable Red and Wait Monitoring	LMU- Sensors
~~KSL~~	-	-	-		(Reserved by PB800/PB801)	-
KSN	-	-	0-255	L2	LMU Surge Delay	LMU- General
KSP	PHASE	ASPECT	1-255	RO	Sensor for Phase / Colour / Channel	LMU- Sensors
KSS	SENSOR	-	-	RO	LMU Sensor Status (part of KES)	LMU- Readings
KTE	-	-	0-5	L2	LMU Trace Enable (Diagnostic Info)	LMU- General
KTR	SENSOR	0-49	-	RO	LMU Trace Record (Diagnostic Info)	(System- Export Site Info)
LAA	LRTUNIT	0-5	0-255	L2	LRT Advance Influence Time (set A)	LRT- Advance Actions
LAB	LRTUNIT	0-5	0-255	L2	LRT Advance Influence Time (set B)	LRT- Advance Actions
LAC	LRTUNIT	0-5	0-255	L2	LRT Advance Influence Time (set C)	LRT- Advance Actions
LAD	LRTUNIT	0-5	0-255	L2	LRT Advance Influence Time (set D)	LRT- Advance Actions
LAE	LRTUNIT	0-5	0-255	L2	LRT Advance Influence Time (set E)	LRT- Advance Actions
LAF	LRTUNIT	0-5	0-255	L2	LRT Advance Influence Time (set F)	LRT- Advance Actions
LAG	LRTUNIT	0-5	0-255	L2	LRT Advance Influence Time (set G)	LRT- Advance Actions
LAH	LRTUNIT	0-5	0-255	L2	LRT Advance Influence Time (set H)	LRT- Advance Actions
LAQ	LRTUNIT	0-5	0-12	L2	LRT Advance Influence Function	LRT- Advance Actions

CODE	INDEX1	INDEX2	DATA	A	DESCRIPTION	WEB PAGE
LAR	LRTUNIT	0-5	PHASE	L2	LRT Advance Influence Phase	LRT- Advance Actions
LAS	LRTUNIT	-	-	RO	LRT Advance Influence Status	(LRT- Status)
LAT	0-7	PHASE	0.0-31.8	L3	Variable Amber Leaving Time	-
LBD	0-7	0-2	0-299.99	L3	Last Lamp Bright / Dim Voltage	Last Lamp- Profiles
LBH	-	-	0-255	L3	Low Lamp Supply – Bright Hysteresis	-
LBT	-	-	0-255	L3	Low Lamp Supply – Bright Threshold	-
LCA	LRTUNIT	PHASE	0-255	L2	LRT phase compensation time (set A)	LRT- Compensation Times.
LCB	LRTUNIT	PHASE	0-255	L2	LRT phase compensation time (set B)	LRT- Compensation Times.
LCC	LRTUNIT	PHASE	0-255	L2	LRT phase compensation time (set C)	LRT- Compensation Times.
LCD	LRTUNIT	PHASE	0-255	L2	LRT phase compensation time (set D)	LRT- Compensation Times.
LCE	LRTUNIT	PHASE	0-255	L2	LRT phase compensation time (set E)	LRT- Compensation Times.
LCF	LRTUNIT	PHASE	0-255	L2	LRT phase compensation time (set F)	LRT- Compensation Times.
LCG	LRTUNIT	PHASE	0-255	L2	LRT phase compensation time (set G)	LRT- Compensation Times.
LCH	LRTUNIT	PHASE	0-255	L2	LRT phase compensation time (set H)	LRT- Compensation Times.
LDA	LRTUNIT	LRTTSET	0-255	L2	LRT Advance Event Delay	LRT- General Timing
LDC	LRTUNIT	LRTTSET	0-255	L2	LRT Cancel Event Delay	LRT- General Timing
LDH	-	-	0-255	L3	Low Lamp Supply – Dim Hysteresis	-
LDP	LRTUNIT	LRTTSET	0-255	L2	LRT Prepare Event Delay	LRT- General Timing
LDS	LRTUNIT	-	-	RO	LRT Delay And Event Status	(LRT- Status)
LDT	-	-	0-255	L3	Low Lamp Supply – Dim Threshold	-
LEC	LRTUNIT	LRTTSET	0-255	L2	LRT Cancel Event Timeout	LRT- General Timing
LED	-	-	0-2	O	Mimic LED Mode (LSLS Only)	Misc
LEV	-	-	3	L2	Access Level Obtained	(Access Level)
LFI	LRTUNIT	LRTTSET	0-2550	L2	LRT Following Inhibit Period	LRT- General Timing
LFP	LRTUNIT	-	-	RO	LRT Following Inhibit Period Remaining	LRT- Status
LFS	STREAM	0-31	-	RO	Link Fixed Time Stage Combinations	Fixed Time- Linked
LFT	0-31	-	0-255	L2	Stage Combination Duration	Fixed Time- Linked
LIB	0-7	0-2	0-65535	L3	Last Lamp Current Threshold – Bright	Last Lamp- Profiles
LID	0-7	0-2	0-65535	L3	Last Lamp Current Threshold – Dim	Last Lamp- Profiles
LIS	LRTUNIT	-	-	RO	LRT INHIBIT STATUS	LRT- Status- Inhibit.
LKA	STREAM	-	0-255	L2	Link Active Fail Time	Pedestrian- Linking
LKD	STREAM	-	0-255	L2	Link Delay Time	Pedestrian- Linking
LKI	STREAM	-	0-255	L2	Link Inactive Fail Time	Pedestrian- Linking
LKM	0-1	-	0-1	L2	Link Override Timer Mode	Pedestrian- Standalone
LKO	STREAM	-	0-255	L2	Link Override Time	Pedestrian- Linking
LKW	STREAM	-	0-255	L2	Link Window Time	Pedestrian- Linking
LLA	0-7	0-2	0-1	L3	Last Lamp Fault Action	Last Lamp- Profiles
LLC	0-7	0-2	0-65535	L3	Last Lamp Confirm Time	Last Lamp- Profiles
LLD	STREAM	-	0-1	L2	Local Link Disable	-
LLE	SENSOR	0-5	-	RO	Last Lamp Errors	Last Lamp- Status
LLF	SENSOR	ASPECT	-	RO	Last Lamp Faults	LMU- Readings
LLO	0-7	0-2	0-1	L3	Last Lamp Faults Only	Last Lamp- Profiles
LLP	SENSOR	-	0-7,255	L3	Last Lamp Profile for Sensor	LMU- Sensors
LLS	SENSOR	-	-	RO	Last Lamp Colour State	Last Lamp- Status
LLT	SENSOR	-	-	RO	Last Lamp Threshold Value	Last Lamp- Status
LLW	0-7	0-2	0-65535	L3	Last Lamp Delay Time	Last Lamp- Profiles
LMC	-	-	1-3	L3	Lamp Test Colour Selected	Phases- Lamp Test
LMH	-	-	PHASE	L3	Lamp Test Phase Selected	Phases- Lamp Test
LMP	PHASE	-	1-3	L3	Illuminate Phase Aspect	Phases- Lamp Test
LMS	-	-	0-255	L3	Lamp Test Requested Duration	Phases- Lamp Test
LMT	-	-	-	RO	Lamp Test Remaining	Phases- Lamp Test
LMX	-	-	-	RO	Use RLT	-
LOD	-	-	-	L3	Reserved – Do Not Use	-
~~LOG~~	-	-	-		(Reserved by PB800/PB801)	(System Log)
LOI	LRTUNIT	LRTTSET	0-2550	L2	LRT Overlap Inhibit Period	LRT- General Timing
LOP	LRTUNIT	-	-	RO	LRT Overlap Inhibit Count	LRT- Status
LOW	LRTUNIT	LRTTSET	0-255	L2	LRT Overlap Window Period	LRT- General Timing
LPA	LRTUNIT	0-5	0-255	L2	LRT Prepare Influence Time (set A)	LRT- Prepare Actions

CODE	INDEX1	INDEX2	DATA	A	DESCRIPTION	WEB PAGE
LPB	LRTUNIT	0-5	0-255	L2	LRT Prepare Influence Time (set B)	LRT- Prepare Actions
LPC	LRTUNIT	0-5	0-255	L2	LRT Prepare Influence Time (set C)	LRT- Prepare Actions
LPD	LRTUNIT	0-5	0-255	L2	LRT Prepare Influence Time (set D)	LRT- Prepare Actions
LPE	LRTUNIT	0-5	0-255	L2	LRT Prepare Influence Time (set E)	LRT- Prepare Actions
LPF	LRTUNIT	0-5	0-255	L2	LRT Prepare Influence Time (set F)	LRT- Prepare Actions
LPG	LRTUNIT	0-5	0-255	L2	LRT Prepare Influence Time (set G)	LRT- Prepare Actions
LPH	LRTUNIT	0-5	0-255	L2	LRT Prepare Influence Time (set H)	LRT- Prepare Actions
LPQ	LRTUNIT	0-5	0-12	L2	LRT Prepare Influence Function	LRT- Prepare Actions
LPR	LRTUNIT	0-5	PHASE	L2	LRT Prepare Influence Phase	LRT- Prepare Actions
LPS	LRTUNIT	-	-	RO	LRT Prepare Influence Status	(LRT- Status)
LPT	-	-	0-1	L2	Manual Panel Lamp Test	-
LRB	0-7	0-2	0-65535	L3	Last Lamp Resistive Threshold – Bright	Last Lamp- Profiles
LRD	0-7	0-2	0-65535	L3	Last Lamp Resistive Threshold – Dim	Last Lamp- Profiles
~~LRN~~	-	-	-		(Reserved by PB800/PB801)	-
LSC	LRTUNIT	LRTTSET	0-255	L2	LRT Stopline Cleared Event Delay	LRT- General Timing
LSF	-	-	1-25	L3	Lamp Supply Off Confirm Time (20MS)	-
LSI	LRTUNIT	LRTTSET	0-255	L2	LRT Stopline Presence Influence Period	LRT- General Timing
LSN	-	-	1-255	L3	Lamp Supply On Confirm Time (Secs)	-
LSP	LRTUNIT	LRTTSET	0-255	L2	LRT Stopline Presence Event Delay	LRT- General Timing
LST	-	-	0-255	L3	Lamp Supply Report Failure Confirm Time	-
LUP	LRTUNIT	-	-	RO	LRT Unit Phase	LRT- Prepare Actions
LUS	LRTUNIT	-	-	RO	LRT Unit Status	(LRT- Status)
LWB	0-7	0-2	0-65535	L3	Last Lamp Power Threshold – Bright	Last Lamp- Profiles
LWD	0-7	0-2	0-65535	L3	Last Lamp Power Threshold – Dim	Last Lamp- Profiles
MAX	PHASE	-	0-255	L2	Maximum Green Period Timeset A	Phases- Times
MBX	PHASE	-	0-255	L2	Maximum Green Period Timeset B	Phases- Times
MCM	1-17	-	0-2	L2	Maximum green Control for each Mode	MOVA Mode UTC Mode
MCX	PHASE	-	0-255	L2	Maximum Green Period Timeset C	Phases- Times
~~MDM~~	-	-	-		(Reserved by PB800/PB801)	-
MDX	PHASE	-	0-255	L2	Maximum Green Period Timeset D	Phases- Times
MEX	PHASE	-	0-255	L2	Maximum Green Period Timeset E (Fixed Vehicle Period Set A)	Phases- Times
MFQ	-	-	-	RO	Mains frequency	Clocks Supply
MFX	PHASE	-	0-255	L2	Maximum Green Period Timeset F (Fixed Vehicle Period Set B)	Phases- Times
MGX	PHASE	-	0-255	L2	Maximum Green Period Timeset G (Fixed Vehicle Period Set C)	Phases- Times
MHX	PHASE	-	0-255	L2	Maximum Green Period Timeset H (Fixed Vehicle Period Set D)	Phases- Times
MIN	PHASE	-	0-255	L3	Phase Minimum Green Period	Phases- Times
MND	-	-	0-1	L2	Manual Mode Disable	Misc
MOD	STREAM	-	-	RO	Current Operating Mode	Phases- Status
MOX	STREAM	-	-	RO	Mode Extra Details (part of STS)	Phases- Status
MPA	0-3	-	0-255	L3	Manual Panel Allocation	-
MST	0-3	-	DATA	L2	Set Mains-Sync Change Time	-
MTS	-	-	-	RO	Master Time Clock Status (CLF Mode Inhibit Causes)	CLF- Status
MTV	PHASE	-	-	RO	Minimum Green Threshold Value	Phases- Times
MVC	-	-	0-255	L2	MOVA Control Timer (10s Units)	MOVA mode
MVD	-	-	0.0-31.8	L2	MOVA Deactivate Time	MOVA mode
MVR	-	-	0-255	L2	MOVA Release Timer	MOVA mode
MVU	-	-	0-1	L2	MOVA Reporting Mode	MOVA mode
OFF	PLAN	0-1	0-255	L2	Group Offset Time	CLF- Plans
OFZ	STAGE	-	-	RO	Phases in Stage (inc. Optional Phases)	-
~~OMF~~	-	-	-	L2	Integral OMU (IMU) fitted.	-
~~OMH~~	-	-	-		(Reserved by PB800/PB801)	-

CODE	INDEX1	INDEX2	DATA	A	DESCRIPTION	WEB PAGE
~~OMS~~	-	-	-		(Reserved by PB800/PB801)	-
~~OTF~~	-	-	-		(Reserved by PB800/PB801)	-
~~OTH~~	-	-	-		(Reserved by PB800/PB801)	-
~~OTO~~	-	-	-		(Reserved by PB800/PB801)	-
~~OTS~~	-	-	-		(Reserved by PB800/PB801)	-
OPT	0-7	-	0-1	L2	Compatibility Options	Stages- Settings LMU- General
PA2	PRIUNIT	PRITSET	0-255	L2	Priority Compensation Time Phase A2	-
PAR	STREAM	0-4	0-255	L3	Pedestrian All Red (Seconds)	Pedestrian- Streams
PB2	PRIUNIT	PRITSET	0-255	L2	Priority Compensation Time Phase B2	-
PBG	DFMGRP		0-1	L2	Identify Push-Button DFM Groups	I/O- DFM Groups
PBT	PHASE	-	0-255	L3	Ped Blackout/Flashing Green Time	Pedestrian- Phase
PCx	PRIUNIT	PRITSET	0-255	L2	Priority Compensation Time Phase x (Where 'x' is 'A'-'Z')	-
PC2	PRIUNIT	PRITSET	0-255	L2	Priority Compensation Time Phase C2	-
PD2	PRIUNIT	PRITSET	0-255	L2	Priority Compensation Time Phase D2	-
PDD	PHASE	-	0-255	L2	Pedestrian Demand Delay Time	Pedestrian- Phase
PDE	PRIUNIT	PRITSET	0-1	L2	Priority Unit Demand Enable	Priority- General
PDR	PRIUNIT	-	0-255	L2	Priority Unit DFM Self-Reset Enable	Priority- General
PDS	-	-	-	RO	Priority Demand/Extension Status	-
PDX	PHASE	-	0.0-31.8	L2	Pedestrian Demand Extension	Pedestrian- Phase
PE2	PRIUNIT	PRITSET	0-255	L2	Priority Compensation Time Phase E2	-
PEV	STREAM	-	0-2	L3	Pedestrian Enable VA Mode	Pedestrian- Streams
PF2	PRIUNIT	PRITSET	0-255	L2	Priority Compensation Time Phase F2	-
PFD	PRIUNIT	-	0-255	L2	Priority Unit First Delay Time	Priority- Times
PFN	PLAN	GROUP	-	RO	Plan Function (also see IFN)	CLF- Plan Times
PFT	0-2	-	DATA	L2	RTC Power Fail Limit Time	-
PFZ	PRIUNIT	-	-	RO	Priority Phase	Priority- General
~~PGT~~	-	-	-		(Use MIN)	-
PHC	HRYUNIT	-	0-255	L2	Hurry Call Prevent Period	Hurry Call
PHD	PHASE	-	0-1	L2	Manual Phase Demand	-
PHE	PHASE	-	0-1	L2	Manual Phase Extension	-
~~PHS~~	-	-	-		(Reserved by PB800/PB801)	-
PHT	PHASE	-	0-4	RO	Phase Type	-
PIA	-	-	-	RO	Priority Inhibit Timer Status	-
PIC	-	-	-	RO	Program ID Code	(System- Status- Inventory)
PIR	0-479	-	0-255 0-31.8	L2	Pedestrian Inhibit Timers (Conditioning Timers)	Special Conditioning- Timers
PIT	STREAM	0-3	0-255	L3	Pelican Intergreen Time	Pedestrian- Streams
PIU	-	-	-	RO	Priority Units Inhibited	-
~~PLD~~	-	-	-		(Reserved by PB800/PB801)	-
PLE	PLAN	-	0-255	L2	Plan Entry Time	CLF- Plans
PLF	PLAN	-	0-80	L2	Plan Fast Factor	CLF- Plans
PLI	PLAN	-	0-15	L2	Plan Influence Set Selection	CLF- Plans
PLS	PLAN	-	0-150	L2	Plan Slow Factor	CLF- Plans
PLT	PLAN	GROUP	0-255	L2	Plan-Group Time Settings	CLF- Plan Times
PLX	PLAN	-	0-255	L2	Plan Exit Time	CLF- Plans
PME	-	-	CODE	O	Maintenance Access	-
PMT	PRIUNIT	-	0-255	L2	Priority Unit Monitor Time (0s-2550s)	Priority- General
PMV	-	-	0-255	L2	Pedestrian Movement Algorithm	Stages- Settings
PRE	PRIUNIT	PRITSET	0-1	L2	Priority Unit Reversion Demand Enable	Priority- General
PRI	PRIUNIT	PRITSET	0-1	L2	Priority Unit Revertive Demands To Start Inhibit Timer	Priority- General
PSA	PRIUNIT	PHASE	0-1	L2	Priority Strategy: Demands Allowed	Priority- VA
PSD	PRIUNIT	-	0-255	L2	Priority Unit 2ND Delay Time	Priority- Times
PSE	PRIUNIT	PHASE	0-1	L2	Priority Strategy: Demands Enforced	Priority- VA
PSS	PRIUNIT	PHASE	0-2	L2	Priority Unit Strategy Selection	Priority- VA
PST	PLAN	GROUP	-	RO	Plan Stage (also see IFS)	CLF- Plan Times
PTM	PHASE	-	0-1	L2	Pre-Timed Maximum Enable	Phases- Times
PTX	PHASE	-	0-255	L2	Pre-Timed Maximum Extra Period	Phases- Times

CODE	INDEX1	INDEX2	DATA	A	DESCRIPTION	WEB PAGE
PUI	PRIUNIT	-	00-FF	L2	Priority Units To Be Inhibited	Priority- Inhibit.
PUN	PRIUNIT	PRIUNIT	0-1	L2	Priority Unit To Be Inhibited	Priority- Inhibit.
PUP	PRIUNIT	PHASE	-	RO	Priority Unit Phase	Priority- General
PUT	PRIUNIT	-	-	RO	Priority Unit Type	Priority- General
PVE	PRIUNIT	PRITSET	0.0-31.8	L2	Priority Unit Vehicle Extension Time	Priority- Times
PVG	PRIUNIT	-	0-255	L2	Priority Unit Vehicle Gap Time	Priority- General
PVI	PRIUNIT	PRITSET	0-255	L2	Priority Unit Inhibit Time Period	Priority- Times
PVM	PRIUNIT	PRITSET	0-255	L2	Priority Unit Maximum Time	Priority- Times
PVP	PHASE	-	-	RO	Priority Vehicle Phase Status	-
PVS	STAGE	-	-	RO	Priority Vehicle Stage Status	-
PVU	PRIUNIT	-	-	RO	Priority Vehicle Unit Status	-
PWN	STAGE	-	0-255	L2	Ped. Window period	Stages- Window Times.
RAT	PHASE	-	0-255	L3	Phase Red/Amber Time	-
RBC	-	-	0-255	L2	Remote Reboot Code (Request)	Faults
RBS	-	-	-	RO	Remote Reboot Status (Use RBC)	Faults
RDF	-	-	1	L2	Reset Detector Fault Mon.	Faults
~~RET~~	-	-	-		(Reserved by PB800/PB801)	-
REX	STREAM	-	0.0-31.8	L2	All-Red Extension Period	All Red
RFL	-	-	1	L2	Reset Fault Log	(Fault Table)
RLM	STREAM	-	0-255	L3	Number of RLM Channels Enabled	Pedestrian- RLM
RLS	-	-	0-9	L2	(First) Red Lamp Fault Speed	LMU- General
RLT	PHASE	PHASE	0-255	L3	RLM Extend Intergreen Time	-
RMR	-	-	0-1	L2	Remote Reconnect Disabled/Enabled	-
RMX	STREAM	-	0-255	L2	All-Red Maximum Period	All Red
RPL	-	-	PLAN	L2	Request New CLF Plan (255 to isolate)	-
RRT	-	-	1	L3	Request Lamp Supply Relay Test	-
RSO	0-9	-	0-255	L3	Reserve State Options	
RST	1-4	-	0-255	L3	Restart Supervisor	Restart Supervisor
~~SAC~~	-	-	-		(Reserved by PB800/PB801)	-
SAT	ASS'SOR	-	1-3	L3	SDE/SA Assessor Type	SDE/SA- Assessors
SCI	0-3	-	-	RO	SDE/SA Extra I/G Clearance Status	SDE/SA- Phases
SCR	0-3	-	-	RO	SDE/SA Extra I/G Clearance Request	SDE/SA- Phases
SCT	PHASE	-	0-50	L3	SDE/SA Extra I/G Clearance Time	Phases- Times
SDD	STREAM	-	0-1	L3	SDE/SA Disabled On Stream	Pedestrian- Streams
SDS	-	-	0-2	L3	Type Of High Speed Vehicle Detection	Pedestrian- Standalone
~~SDT~~	-	-	-		(Use SAT)	-
SEA	0-3	-	-	RO	SDE/SA Green Extension Status	SDE/SA- Phases
SGT	-	-	1	L2	Reset CLF Cycle (Group Time)	-
SHC	HRYUNIT	-	-	RO	Hurry Call Status	-
SIC	-	-	-	RO	Secondary (PHP) CPU Firmware Version	(Inventory)
~~SIE~~	-	-	-		(Use RLT)	-
SLA	-	-	0-255	L3	Simulated Lamp Loads Access Code	-
SLL	PHASE	R,A,G	0-255	L3	Simulated Lamp Loads	-
SPA	ASS'SOR	-	-	RO	SDE/SA Assessor A Loop Count	SDE/SA- Assessors
SPB	ASS'SOR	-	-	RO	SDE/SA Assessor B Loop Count	SDE/SA- Assessors
SPE	ASS'SOR	-	-	RO	SDE/SA Speed And Loop Activations	SDE/SA- Assessors
SPH	PHASE	-	-	RO	Status Of A Phase	Phases- Status
SPI	PHASE	-	-	RO	SDE/SA Extra I/G Clearance Status	SDE/SA- Phases
SPK	ASS'SOR	-	-	RO	SDE/SA Vehicle Speed (KPH)	SDE/SA- Assessors
SPM	ASS'SOR	-	-	RO	SDE/SA Vehicle Speed (MPH)	SDE/SA- Assessors
SPR	PHASE	-	-	RO	SDE/SA Extra Intergreen Clearance Request	SDE/SA- Phases
SPT	PHASE	-	-	RO	SDE/SA Green Extension Status	SDE/SA- Phases
SPX	ASS'SOR	-	-	RO	SDE/SA Ext Active For Assessor	SDE/SA- Assessors
STA	-	-	-	RO	Controller Status Message	-
STG	-	-	-	RO	Number Of Configured Stages	-
STM	0-6	-	DATA	L2	Set Master Time Clock (inc Date)	Clocks
STP	0-31	-	0-255	L2	Manual Step-On Time	-
STS	STREAM	-	-	RO	Status of a Stream	Phases- Status

CODE	INDEX1	INDEX2	DATA	A	DESCRIPTION	WEB PAGE
SWS	0-31	-	0-1	L2	Switch Facility	-
TCS	-	-	-	L3	Trip Check Sum **(Engineering Use Only)**	-
TDY	0-15	-	-	RO	Timetable Day Types	-
~~TKD~~	-	-	-		(Use PDX)	-
~~TKE~~	-	-	-		(Reserved by PB800/PB801)	-
TMA	-	-	0-255	L3	Test Mode Access	-
TMC	-	-	0-255	L2	Test Mode Countdown	-
TMR	0-98	0-31	-	RO	Timer Status	(Various)
TMT	-	-	0-255	L2	Test Mode Timer	-
TOD	-	-	TIME DATE	L2	View & Set Controller Time/Date	Clocks
TOT	-	-	0-1	L2	TC/TO UTC Bit Take Over Type	-
TSC	-	-	-	L3	Trip Serial Comms **(Engineering Use Only)**	-
TSD	0-63	-	(DATA)	L2	Timetable Special Days (DATA = Date + Day Code)	Timetable- Special Day
TSE	-	-	-	L3	Trip Soft Error **(Engineering Use Only)**	-
TSH	0-31	0-1	DATE	L2	Special Holiday Periods	Timetable- Special Holiday
TSW	0-63	0-5	(DATA)	L2	Time Switch Timetable (Old Format)	Timetable- Timeswitch
TTB	0-63	-	(DATA)	L2	Time Switch Timetable (New Format)	Timetable- Timeswitch
TTC	-	-	-	RO	Current Max Green Timeset	Clocks
TTD	0-63	0-1	(DATA)	L2	Timetable Special Days (DATA=Date or Day Code)	Timetable- Special Day
TWD	-	-	1 or 2	L3	Trip Watchdog **WARNING – CAUSES IMMEDIATE SHUTDOWN CONSEQUENTLY MUST NOT BE USED UNDER ANY CIRCUMSTANCES TO TEST EQUIPMENT WITH SIGNALS ON AND CONTROLLING TRAFFIC.**	-
TYG	1-3	-	-	RO	Gaining Phase Types	-
~~UDP~~	-	-	-		Reserved – Do Not Use	-
UDT	0-7	-	0-255	L2	U/D Timeout (in 10 Second Units)	I/O- U/D
UIE	STREAM		0-255	L2	UTC Inhibit Extension Period For Standalone Pedestrian Stream	Pedestrian- Linking
~~USE~~	-	-	-		Reserved – Do Not Use	-
UWD	-	-	0-255	L2	UTC Watchdog	Stages- Settings
~~VAD~~	-	-	-		(Use PEV/PTM)	-
~~VAE~~	-	-	-		(Use EXT/IPX)	-
~~VAM~~	-	-	-		(Use MIN)	-
~~VAX~~	-	-	-		(Use MAX-MDX)	-
VFF	-	-	-	RO	Firmware Version In Fail Flash Micro	(Inventory- Firmware)
VIO	1-15	-	-	RO	Firmware Version In Each I/O Card	(Inventory- Firmware)
VLS	1-6	-	-	RO	Firmware Version In Each LSLS Card	(Inventory- Firmware)
VPR	-	-	-	RO	Firmware Version In Primary CPU	(Inventory- Firmware)
VSE	-	-	-	RO	Firmware Version In Secondary CPU	(Inventory- Firmware)
~~WEK~~	-	-	-		(Reserved by PB800/PB801)	-
WID	-	-	14 - 80x24	O	Handset Display Width	-
XCT	1-32	0-479	0-255, 0-31.8	L2	Extended Conditioning Timers (DVI35)	-
XDX	1-22	1-32	0.0-25.5	L2	Extended Detector Extensions (DVI35)	-
XRC	0-5	-	-	L2	DVI35 Received data	-
ZIO	IOLINE	-	-	RO	I/O Line status information	(Site UI)
ZLP	0-31	0-4	0-65535	RO	Lamp fault per Phase / Colour	(for internal use)
ZPT	PHASE	-	-	RO	Phase type information	(Site UI)
ZST	STREAM	-	(TEXT)	RO	Stream type	(for internal use)
ZZF	-	-	-	L2	Debug Flags (**Engineering Use Only**)	-

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13 APPENDIX – ENGINEERING COMMANDS

13.1 General

The following engineering commands have been included to enable access to more comprehensive status information than that generally available from the standard handset commands.

Most of these commands are only of use to Siemens Engineering. However the ENG command does allow the configuration and maintenance Engineers access to additional status information not available from the standard handset commands. The 'ENG' command is detailed more thoroughly in the rest of this section.

	DESCRIPTION AND REMARKS	
BAS	BAS : <Base Type 0 to 3> Number **BAS**e used by the engineering commands: `BAS:0` – Single byte displayed in hexadecimal (two digits) `BAS:1` – Single byte displayed in binary (eight bits) `BAS:2` – Single byte displayed in decimal (0 to 255) `BAS:3` – Four bytes displayed in binary (32 bits) 'BAS:3' is particularly useful since it displays 32 bits simultaneously and thus allows the status of all 32 phases or stages to be examined when used with various ENG codes. If the display device is not wide enough, the base will revert to eight binary bits.	2
ENG	ENG <Code> <Offset> : <RAM Contents> Displays particular engineering items in the controller's memory.	R

13.2 ENG Command Explanations

This section gives an explanation on what each of the codes used in the 'ENG' handset command means.

The 'Code' column identifies the 'ENG' code number used to access that particular item of information. It also identifies the display base, '`BAS:n`', which is best suited to each particular engineering command, or '(`ANY`)' if display base is not critical as just a non-zero value in the byte indicates the condition.

The 'Description' column shows the mnemonic, the title and then the format of the information. The mnemonic is the name used within the controller's software and is only included here as an aid to memory. It should not be entered on the handset.

Those ENG commands which are best suited to 'BAS:3', i.e. 32 binary bits, usually show the status of all 32 phases, i.e. one bit per phase set to '1' if the condition is true. This will be written in the following form in this section so that it identifies of the order of the phases A to Z, followed by A2 to F2, starting at the right-hand side:

```
ENG 2 8:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
        |    | \                         /
        F2   A2    PHASES Z THROUGH TO A
```

Alternatively, the command may show the status of all 32 stages, i.e. one bit per stage, numbered 0 to 31, again starting at the right-hand side.

```
ENG 2 12:10987654 32109876 54321098 76543210
         |  \       /  \       /  \        |
        31  29     20  19     10   9        0
```

'BAS:3' is only available if the display device is wide enough, see 'WID' on page 21. If the display is not wide enough, the controller will automatically revert to 'BAS:1', i.e. just one byte (eight binary bits) is displayed instead of 32 bits.

If a 32-bit item is being viewed one byte at a time:

```
ENG 2 8:HGFEDCBA
ENG 2 9:PONMLKJI
ENG 2 10:XWVUTSRQ
ENG 2 11:FEDCBAZY
```

13.3 "ENG" Code List (Sorted by 'Description')

MNEMONIC	CODE	OFFSET	DESCRIPTION
DFMFLT	122	0-11	ACCEPT DETECTOR FAULT(S) see also H/S command ADF
UTCAIN	52	0-11	ACCEPTED UTC INPUTS
ALTDFM	196	0	ALTERNATE DFM TIME SET SELECTED FLAGS
ALTMAX	51	0	ALTERNATIVE MAX. GREEN SELECT FLAGS
AVLMDE	60	0-15	AVAILABLE MODE TABLE
ESP_MOVA_Forc	269		BITS TO/FROM SERIAL MOVA/DUSC UNIT
CABCTL	119	0	CABINET ALARM CONTROL
CABLMP	147	0	CABINET ALARM LAMP CONTROL
CCOUTF	40	0	CALL/CANCEL COMPLIMENTARY OUTPUTS
CCSTT	96	0-7	CALL/CANCEL STATE NO.
CCOUTT	39	0	CALL/CANCEL TRUE OUTPUTS
CURPLN	85	0	CLF CURRENT PLAN NO.
CLFDEM	93	0-3	CLF DEMAND
ENT_TIM_CTRL	218		CLF ENTRY TIMER CONTROL INDICATION
EXIT_TIM_CTRL	219		CLF EXIT TIMER CONTROL INDICATION
CLFFRC	92	0-3	CLF FORCE
CLFKEP	94	0-3	CLF KEEP
CLFINH	192	0-3	CLF PEDESTRIAN INHIBIT WORD
CLFRST	95	0-3	CLF RESTRICT
OICDEM	159	0-3	COMBINED PHASE DEMAND
OICKEEP	161	0-3	COMBINED PHASE KEEP
OICKEOR	162	0-3	COMBINED KEEP OVERRIDE
OICREQ	160	0-3	COMBINED PHASE REQUEST
OICREST	163	0-3	COMBINED PHASE RESTRICTION
CNDARY	151	0-255	CONDITIONING ARRAY
CNDTMA	58	0-59	CONDITIONING TIMERS ACTIVE

MNEMONIC	CODE	OFFSET	DESCRIPTION
CNDPRV	59	0-59	CONDITIONING TIMERS ACTIVE ON LAST 200Ms
CNDTER	50	0-59	CONDITIONING TIMERS JUST TERMINATING
LMPMON_confirmed_drops	232		CONFIRMED LAMP FAULTS
cor_errors_confirmed	228		CORRESPONDENCE ERRORS CONFIRMED
CURCOM	131	0-7	CURRENT COMPENSATION TIME (PRIORITY UNITS)
MODE	107	0-3	CURRENT MODE
CURSTG	105	0	CURRENT STAGE
ROWFAZ	33	0-3	CURRENTLY ACTIVE PHASES/STAGES
DFMLOG	285		DFM FAULTS - FAILED
DFMDSF0	286		DFM FAULTS - FAILED INACTIVE
DFMDSF1	287		DFM FAULTS - FAILED ACTIVE
DFM_FAULT_STATE	266		DFM FAULT STATE
DFMINH	116	0-7	DFM INHIBIT (PRIORITY UNITS)
DISMDE	150	0-7	DISABLED MODES ON STREAMS
DOORSWI	265		DOOR SWITCH INDICATION
DSRACC	118	0	DSR ACCEPTED STATE
dprcpy	227		DUAL PORT RAM COPY
ENHRLM	211	0-1	ENHANCED RLM PHASE DELAYS RUNNING
ESP_Active	252		ENHANCED SERIAL PORT ACTIVE
ESPORT	275		ESP DEBUG INFORMATION
XIGNDM	127	0-1	EXTRA I/G FOR PHASE BY SDE
FLDATA	153	0-127	CURRENT FAULT DATA
FLFLGS	152	0-63	CURTENT FAULT FLAGS
FLAFLF	168	0-7	FAULT FLAGS THAT CAUSE FLASHING
FLFCOM	169	0-7	FAULT FLAGS THAT CAUSE SPECIAL CONDITIONING FLAG TO BE SET
PVD1EX	170	0	FIRST PRIORITY DELAY TIMER EXPIRED FLAG
FTCCMPL	99	0-3	FIXED TIME COMPEL
FTCM_acive	239		FIXED TIME TO CURRENT MAXIMUMS ACTIVE
pbusflt	234		FULL PHASE BUS FAULT DATA
GPIPX	248		GENERAL PURPOSEINPUTS EXTENDED
IO_cards_ok	290		GOOD I/O CARDS
HIPRMD	270		HIGHER PRIORITY MODE ACTIVE
HLDENA	21	0-3	HOLD ENABLE
HLDELC	47	0	HOLD I/G EXTENSION LOOPS CLEARED
HLDELO	46	0	HOLD I/G EXTENSION LOOPS OCCUPIED
HLDON	20	0-3	HOLD IN PROGRESS
HIGNO	23	0-3	HOLD INTERGREEN EXTENSION FACILITY NO
HLDREQ	22	0-3	HOLD REQUEST
INHENA	134	0-7	INHIBIT ENABLE (PRIORITY UNITS)
GPIN0	24	0-11	INPUT PORT DATA SET TO 0
GPIN1	25	0-11	INPUT PORT DATA SET TO 1
INTERGREENS_EXPIRED	244		INTERGREENS EXPIRED
JNC-checksum	241		JUNCTION DATA CHECKSUM
KBSACT	255		KERBSIDE INPUTS ACTIVE
LMPDIM	189	0	LAMP DIM/BRIGHT REQUEST (FFH=DIM)
PRSFLS	268		LAMP FLASHING STATES

MNEMONIC	CODE	OFFSET	DESCRIPTION
LMPMON_flashing_config_fault	231		LAMP MONITOR FLASHING CONFIGURATION FAULT
LMPON	188	0	LAMP ON/OFF REQUEST (FFH=ON)
FAZCMD	1	0-15	LAMP SEQUENCE COMMAND TABLE
LPSPRD	67	0	LAMP SUPPLY IS PRESENT
LSTINP	26	0-11	LAST FILTERED INPUTS
PBNLAT	284		LATCHED PUSH BUTTONS
LNKINH	191	0-1	LOCAL LINK PED DEMAND AND EXTN INHIBIT
LRTACTINF	325	0-144	LRT UNIT ACTIVE INFLUENCE FUNCTION
LRTREQ	331		LRT UNIT ACTIVE REQUEST INFLUENCE
LRTCTL	326	0-7	LRT UNIT IDENTIFIER
LRTUNITINH	328	0-47	LRT UNIT INHIBITS ACTIVE
LRTSTATE	327	0-47	LRT UNIT STATE
MNCMPL	98	0-3	MANUAL COMPEL
MANCND	63	0-7	MANUAL CONTROLS TABLE INPUT DATA
MANIND	62	0-2	MANUAL INDICATIONS TABLE
MANMOP	77	0	MANUAL MODE OPERATIVE FLAG
MANSEL	72	0	MANUAL MODE SELECTED FLAG
SRMMSK	187	0-1	MASK TO DISABLE PHASES
MTCINF	45	0	MASTER TIME CLOCK INFLUENCE
NOTAUT	56	0-3	MODE SELECT SWITCH NOT IN AUTO POSITION
background_checksum_counter	230		MONITOR CRC ROUTINES
MTCDEL	65	0-3	MTC DELETED PHASES/STAGES
NXTSTG	104	0	NEXT STAGE
FRETIM	175	0	NUMBER OF TIMES FREE TIME WAS SET TO ZERO
ONCDOK	259		ON CROSSING DETECTOR CHECKING
OMURUN	273		OMU AVAILABLE FLAG
ONCBAD	258		ON CROSSING DETECTOR FAULTY
ONCACT	257		ON CROSSING DETECTORS ACTIVE
GPOUT	43	0-11	OUTPUT PORT DATA
SBYENB	55	0-7	PART TIME ENABLE FLAG
PEDNOWAIT	184	0-3	PEDESTRIAN DEMANDS WHICH DO NOT LIGHT WAIT INDICATORS (SET UP IN CONDITIONING)
PARTMA	264		PEDESTRIAN ALL RED TIMER ACTIVE
CDYTMA	262		PEDESTRIAN CLEARANCE DELAY PERIOD ACTIVE
CRDTMA	263		PEDESTRIAN CLEARANCE RED PERIOD ACTIVE
CMXTMA	261		PEDESTRIAN EXTENDABLE CLEARANCE PERIOD ACTIVE
PBTTMA	260		PEDESTRIAN MINIMUM CLEARANCE PERIOD ACTIVE
PEDBUT	29	0-3	PEDESTRIAN WAIT INDICATOR CONTROL
WTCTRL	216	0-3	PEDESTRIAN WAIT LAMP STATE
LLDMD	183	0-3	PELICAN LOCAL LINK PEDESTRIAN DEMANDS (SET UP IN CONDITIONING)
SCINH	182	0-3	PELICAN UTC VEHICLE EXTENSION INHIBIT (SET UP IN CONDITIONING)
pbuso	235		PHASE BUS DATA NOT CLEARED BY POWER OFF/ON
pbus	226		PHASE BUS INTERFACE ITEMS
FAZDIS	108	0-31	PHASE DISPLAY TABLE
EXTLCL	31	0-3	PHASE EXTENSION LOOPS CLEARED
EXTLOC	30	0-3	PHASE EXTENSION LOOPS OCCUPIED
EXTTMA	42	0-3	PHASE EXTENSION TIMERS ACTIVE

MNEMONIC	CODE	OFFSET	DESCRIPTION
OIKEEP	156	0-55	PHASE KEEP
MXAFAZ	38	0-3	PHASE MAX. GREEN TIMERS ACTIVE
OIDEM	2	0-55	PHASE MOVEMENT DEMANDS PER MODE
OIKEOR	157	0-55	PHASE OVERRIDE PER MODE
OIREQ	155	0-55	PHASE REQUEST PER MODE
OIREST	158	0-55	PHASE RESTRICTION PER MODE
FAZSTU	35	0-31	PHASE STATUS TABLE
FZREST	15	0-3	PHASE/STAGE RESTRICTIONS ENG15 0-3 ENG15 4-3
TONORW	124	0-3	PHASES CHANGING TO NO RIGHT OF WAY
TORW	154	0-3	PHASES CHANGING TO RIGHT OF WAY
PHASE_ENABLES	243		PHASES ENABLED
GIVNRW	11	0-3	PHASES GIVEN RIGHT OF WAY
LMUINH	215	0-3	PHASES INHIBITING BY RLM
MINFAZ	37	0-3	PHASES IN MINIMUM GREEN PERIOD
ATNORW	10	0-3	PHASES NOT AT RIGHT OF WAY
SKPCUR	137	0-28	PHASES SKIPPED OR CURTAILED (PRIORITY UNITS)
TERGAP	126	0-3	PHASES TERMINATING ON A GAP
FZTMEX	125	0-3	PHASES TERMINATING WITH EXTENSIONS PRESENT
GAINRW	12	0-3	PHASES TO GAIN RIGHT OF WAY
GAIRWD	14	0-3	PHASES TO GAIN RIGHT OF WAY DELAYED
LOSERW	13	0-3	PHASES TO LOSE RIGHT OF WAY
LOSERWD	251		PHASES TO LOSE RIGHT OF WAY DELAYED
ROWFAZ	33	0-3	PHASES/STAGES AT RIGHT OF WAY
FAZDEM	16	0-3	PHASES/STAGES DEMANDED ENG16 0-3 / 4-3
FZKEEP	17	0-3	PHASES/STAGES TO KEEP R.O.W ENG17 0-3 / 4-3
LOSING_PHASES	245		PHASES WHICH LOST RIGHT OF WAY
GAINING_PHASES	247		PHASES WHICH MAY GAIN RIGHT OF WAY
PRSLMP	194	0-8	PRESENT STREET LAMP STATES ENG194 0-3 /4-3/ 8-3
PTXTMA	272		PRE-TIMED MAXIMUM EXTRA PERIOD ACTIVE
VPRVNT	32	0-3	PREVENT PHASE/STAGE FROM CONDITIONING ENG32 0-3/ 4-3
PRIDEM	132	0-7	PRIORITY DEMAND
PRLTCH	143	0-7	PRIORITY DEMAND LATCH
PRIEXT	133	0-7	PRIORITY EXTENSION
PRIINP	130	0-7	PRIORITY INPUT ACTIVE
PRSTAT	117	0	PRIORITY STATUS
PBKLAT	256		PUSH BUTTON AND KERBSIDE LATCH
PBNACT	254		PUSH BUTTON DEMANDS ACTIVE
SIOCP	291		RAW SERIAL I/O
RTCONF	238		REAL TIME CLOCK CONFIRM FLAG
CNGTYP	180	0-7	RED TO GREEN CHANGE TYPE FOR PELICAN PEDS
relaytest	229		RELAY TEST INFORMATION
REVLCH	144	0-7	REVERTIVE PRIORITY DEMAND LATCH
RIPCNG	249		RIPPLE CHANGE ACTIVE
RLM_DELAYS_EXPIRED	246		RLM DELAY TIMERS EXPIRED
SCRTCH	167		SCRATCH PAD WORKING AREA
			(REFER TO HANDBOOK FOR OFFSETS)
SDEXOP	149	0-3	SDE EXTENSION INHIBIT
SDINAC	123	0	SDE/SA CARD INACCESSIBLE

MNEMONIC	CODE	OFFSET	DESCRIPTION
SSWMDE	76	0	SELECT SWITCH MODE
SSWACT	271	0-7	SELECT SWITCH MODE ACTIVE
SOFCND	146	0	SIGNALS OFF FROM CONDITIONING
sclf_curr_state	310		SMOOTH CLF STATE
stack_frame	233		STACK DUMP ON FATAL ERROR
SWLMPS	177	0	SOFTWARE LAMP STATE FLAG
STFIRS	19	0-3	STAGE INDIRECT RESTRICTIONS
LMUSTG	240		STAGES INHIBITED BY RED LAMP MONITORING
RIPSTG	250		STAGES TERMINATED BY THE RIPPLE CHANGE
SPCMPL	195	0-3	STEP ON COMPEL 195 0-3/4-3
SBYENB	55	0-7	STANDBY ENABLED FLAG
SUGSTG	18	0-7	SUGGESTED STAGE (PER STREAM)
SWHDIS	41	0-7	SWITCHED SIGN TABLE
SYSLED	176	0	SYSTEM ERROR LED STATUS (BIT4 – 1=LED ON 0=OFF)
TCSYCF	237		TIME CLOCK UTC SYNC FLAG
TMRSEC	164	0-255	TIMER SECONDS VALUE FOR TIMERS SPECIFIED BY
			TIMER MAP
TMRSTU	165		TIMER STATUS FOR TIMERS SPECIFIED BY TIMER MAP
			(REFER TO HANDBOOK FOR OFFSETS)
SAY_checksum	242		TIMING DATA CHECKSUM
TYCODB	276		TYCO DEBUG INFORMATION
TYCORX	277		TYCO RECEIVE BUFFER, LAST RECEIVED MESSAGE
TYCOTX	278		TYCO TRANSMIT BUFFER, LAST TRANSMITTED MSG
UNLPUF	197	0-3	UNLATCHED PUFFIN DEMANDS
UTCINF	53	0	UTC CONDITIONS
DFMGRP_FAULTS	280		UTC ‘DF’ BIT FOR EACH DFM GROUP
UTCFRC	48	0-3	UTC FORCE BITS
UTCFOP	54	0	UTC FORCE BITS PRESENT
UTCINH	190	0-3	UTC PEDESTRIAN AND EXTENSION INHIBIT WORD
VRDMND	100	0-3/4-3	VR DEMANDS PHASE/STAGE
VRKOVR	102	0-3/4-3	VR KEEP OVERRIDE PHASE/STAGE
VRKEEP	101	0-3/4-3	VR KEEP VRKOVR PHASE/STAGE
LATCHD	27	0-3/4-3	VR LATCHED DEMANDS FOR PHASES/STAGES
VRREST	103	0-3/4-3	VR RESTRICT PHASE/STAGE
UNLTCH	28	0-3/4-3	VR UNLATCHED DEMANDS FOR PHASES/STAGES

13.4 "ENG" Code List (Sorted by 'Code')

CODE **DESCRIPTION**

```
  1     FAZCMD – Lamp Sequence Command Table

BAS:1   ENG 1  0:XXXXXXXX – Commands for Phase A
        ENG 1  1:XXXXXXXX – Commands for Phase B
        ENG 1  2:XXXXXXXX – Commands for Phase C
        ..........................................
        ENG 1 31:XXXXXXXX – Commands for Phase F2

        Where each bit indicates the following:
        00000001 – Lamps Off
        00000010 – Go To Standby
        00000100 – Start-up
        00001000 – Sequence Timer Expired
        00010000 – Go To Red
        00100000 – Go To Green
        01000000 – Light Wait Indicator
        10000000 – Request Green

        Note that a phase may have the 'Request Green' flag set even
        though it may never actually go to green.

        The request for green informs the controller that this phase may
        gain right of way and that all of the intergreen times to this
        phase need to be checked.

        When all of the intergreens have expired, the 'Request Green' flag
        is cleared from here and the appropriate bit is set in
        INTERGREENS_EXPIRED (ENG 244).
```

Also see page 239.

CODE **DESCRIPTION**

```
  2     OIDEM - Phase And Stage Movement Demands Per Mode

BAS:3   Phase/Stage Demands For each mode:

        FT:      ENG 2   8:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
                 ENG 2  12:10987654 32109876 54321098 76543210

        VA:      ENG 2  16:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
                 ENG 2  20:10987654 32109876 54321098 76543210

        CLF:     ENG 2  24:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
                 ENG 2  28:10987654 32109876 54321098 76543210

        Manual:  ENG 2  32:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
                 ENG 2  36:10987654 32109876 54321098 76543210

        Hurry:   ENG 2  40:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
                 ENG 2  44:10987654 32109876 54321098 76543210

        UTC:     ENG 2  48:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
                 ENG 2  52:10987654 32109876 54321098 76543210

        P/Time:  ENG 2  56:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
                 ENG 2  60:10987654 32109876 54321098 76543210

        S/Up:    ENG 2  64:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
                 ENG 2  68:10987654 32109876 54321098 76543210

        FVP:     ENG 2  72:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
                 ENG 2  76:10987654 32109876 54321098 76543210

        StepOn:  ENG 2  80:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
                 ENG 2  84:10987654 32109876 54321098 76543210

        Em/Veh:  ENG 2  96:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
                 ENG 2 100:10987654 32109876 54321098 76543210

        Prior:   ENG 2 104:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
                 ENG 2 108:10987654 32109876 54321098 76543210

        Pel/VA:  ENG 2 112:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
                 ENG 2 116:10987654 32109876 54321098 76543210


  10    ATNORW - Phases Not At Right Of Way

BAS:3   ENG 10 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
```

See page 239.

CODE **DESCRIPTION**

12 GAINRW – Phases To Gain Right Of Way

BAS:3 ENG 12 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that this phase may gain right of way during the current stage movement, but that it is currently running a gaining phase delay.

(Also see ENG 247 – 'GAINING_PHASES' and page 239)

13 LOSERW – Phases To Lose Right Of Way

BAS:3 ENG 13 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that this phase is to lose right of way during the current stage movement, but that it is currently running a losing phase delay.

Also see ENG 245 – 'LOSING_PHASES' and page 239.

14 GAIRWD – Phases To Gain Right Of Way Delayed

BAS:3 ENG 14 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that this phase may gain right of way during the current stage movement and its gaining phase delay (if any) has expired. See page 239.

15 FZREST – Phase/Stage Restrictions

BAS:3 ENG 15 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 15 4:10987654 32109876 54321098 76543210

A '1' means that the phase or stage is deleted and is the combination of OICREST (ENG163) and STGIRS (ENG19).

16 FAZDEM – Phases/Stages Demanded

BAS:3 ENG 16 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 16 4:10987654 32109876 54321098 76543210

A '1' means that the phase or stage is demanded when considering the next stage to move to. For example, if PMV is set to zero, the demands for Type 1 phases in the current stage will be excluded.

CODE **DESCRIPTION**

17 FZKEEP – Phase/Stages To Keep Right Of Way

BAS:3 ENG 17 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 17 4:10987654 32109876 54321098 76543210

A '1' means that the phase or stage is to keep right of way when considering the next stage move. As well as taking into account extensions, this also indicates which phases are currently moving to right of way and those which are running min green timers, i.e.
- any phases in GAINING_PHASES (ENG 247) which are also in PHASE_ENABLES (ENG 243)
- any phases in TORW (ENG 154)
- any phases in MINFAZ (ENG 37)
- any phases in OICKEEP (ENG 161) which are not in OICKEOR (ENG 162)

18 SUGSTG – Suggested Stage

BAS:2 ENG 18 0:N – Suggested stage for stream 0
ENG 18 1:N – Suggested stage for stream 1
.....
ENG 18 7:N – Suggested stage for stream 7

Contains the number of the stage that the controller is considering moving to at a particular point in time.

19 STGIRS – Stage Indirect Restrictions

BAS:3 ENG 19 0:10987654 32109876 54321098 76543210

A '1' indicates that this stage may not be considered as a stage to move to when the controller is deciding which stage to move to because the move has been configured as an ignore for example.

20 HLDON – Hold In Progress

(ANY) ENG 20 0:N – Hold in progress on stream 0
ENG 20 1:N – Hold in progress on stream 1
.....
ENG 20 7:N – Hold in progress on stream 7

A non-zero value indicates that a hold intergreen (all red extension) is in progress on that stream.

CODE	DESCRIPTION

21 HLDENA – Hold Enable

(ANY) ENG 21 0:N – Hold enabled on stream 0
ENG 21 1:N – Hold enabled on stream 1
.....
ENG 21 7:N – Hold enabled on stream 7

A non-zero value indicates that the hold intergreen is enabled on that stream.

22 HLDREQ – Hold Request

(ANY) ENG 22 0:N – Hold request is present on stream 0
ENG 22 1:N – Hold request is present on stream 1
.....
ENG 22 7:N – Hold request is present on stream 7

A non-zero value indicates that a hold intergreen request is present on that stream.

23 HIGNO – Hold Intergreen Extension Facility Number

BAS:2 ENG 22 0:N – Unit active on stream 0
ENG 22 1:N – Unit active on stream 1
.....
ENG 22 7:N – Unit active on stream 7

If 'N' is non-zero, it indicates the hold intergreen unit that is active during the current stage to stage move on the specified stream.

24 GPIN0 – Input Port Data Set To One When Inactive

BAS:1 ENG 24 0:XXXXXXXX – Inputs inactive on port 0
ENG 24 1:XXXXXXXX – Inputs inactive on port 1
.....
ENG 24 30:XXXXXXXX – Inputs inactive on port 30

A '1' indicates that that I/O line on the port was seen inactive during the previous 200ms.

25 GPIN1 – Input Port Data Set To One When Active

BAS:1 ENG 25 0:XXXXXXXX – Inputs Active on port 0
ENG 25 1:XXXXXXXX – Inputs Active on port 1
.....
ENG 25 30:XXXXXXXX – Inputs Active on port 30

A '1' indicates that that I/O line on the port was seen active during the previous 200ms.

CODE **DESCRIPTION**

26 LSTINP – Last Filtered Inputs

BAS:1 ENG 26 0:XXXXXXXX – Inputs Active on port 0
ENG 26 1:XXXXXXXX – Inputs Active on port 1
.....
ENG 26 30:XXXXXXXX – Inputs Active on port 30

A '1' indicates that that I/O line on the port was active at the end of the last 200mS cycle.

27 LATCHD – VR Latched Demands For Phases/Stages

BAS:3 ENG 27 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 27 4:10987654 32109876 54321098 76543210

A '1' indicates that there is a latched demand for the associated phase or stage, i.e. a demand present which can not normally be cleared until the phase/stage gains right of way. These demands may have been generated by various facilities.

Also see:
ENG 29 – PEDBUT
ENG 100 – VRDMND
ENG 184 – PEDNOWAIT
ENG 197 – UNLPUF
ENG 216 – WTCTRL
ENG 256 – PBKLAT

28 UNLTCH – VA Unlatched Demands For Phases/Stages

BAS:3 ENG 28 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 28 4:10987654 32109876 54321098 76543210

A '1' indicates that there is an unlatched demand for the associated phase or stage, e.g. a demand which may cease before the phase gains right of way. Normally only generated by special conditioning or call/cancel units.

29 PEDBUT – Pedestrian Wait Indicator Control

BAS:3 ENG 29 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the firmware is requesting the wait indicator to be illuminated.

Also see:
ENG 27 – LATCHD
ENG 100 – VRDMND
ENG 184 – PEDNOWAIT
ENG 197 – UNLPUF
ENG 216 – WTCTRL
ENG 256 – PBKLAT

CODE **DESCRIPTION**

30 EXTLOC – Phase Extension Loops Occupied

```
BAS:3  ENG 30 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
```

A bit set to '1' indicates that one or more of the detectors associated with the phase have been seen active during the previous 200ms sample period.

31 EXTLCL – Phase Extension Loops Cleared

```
BAS:3  ENG 31 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
```

A bit set to '1' indicates that one or more of the detectors associated with the phase were still active at the end of the previous 200ms sample period.

32 VPRVNT – Prevent Stage/Phase From Conditioning

```
BAS:3  ENG 32 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
       ENG 32 4:10987654 32109876 54321098 76543210
```

33 ROWFAZ – Phases/Stages At Right Of Way

```
BAS:3  ENG 33 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
       ENG 33 4:10987654 32109876 54321098 76543210
```

A bit set to '1' indicates that the phase/stage is at right of way. Also see page 239.

35 FAZSTU – Displays The Phase's Status

```
BAS:1  ENG 35  0:XXXXXXXX – Status of Phase A
       ENG 35  1:XXXXXXXX – Status of Phase B
       ....................................
       ENG 35 31:XXXXXXXX – Status of Phase F2
```

Where each bit indicates the following:
00000001 – At Right Of Way
00000010 – Changing to No Right Of Way
00000100 – At No Right Of Way
00001000 – Changing to Right Of Way
00010000 – Stand-by / part-time state
00100000 – Not Used
01000000 – Not Used
10000000 – Not Used

37 MINFAZ – Phases In Minimum Green Period

```
BAS:3  ENG 37 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
```

CODE **DESCRIPTION**

38 MXAFAZ – Phases Max Green Timer Active

BAS:3 ENG 38 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the maximum green timer for the phase is currently active. Also see ENG 272 – PTXTMA.

39 CCOUTT – Call Cancel True Outputs

BAS:1 ENG 39 0:XXXXXXXX

Where each bit indicates the following:
00000001 – Output for Call/Cancel Unit 0 is Active
00000010 – Output for Call/Cancel Unit 1 is Active
.....
10000000 – Output for Call/Cancel Unit 7 is Active

40 CCOUTF – Call/Cancel Complimentary Outputs

BAS:1 ENG 40 0:XXXXXXXX

Where each bit indicates the following:
00000001 – Output for Call/Cancel Unit 0 is Inactive
00000010 – Output for Call/Cancel Unit 1 is Inactive
.....
10000000 – Output for Call/Cancel Unit 7 is Inactive

41 SWHDIS – Switched Sign Table

(ANY) ENG 41 0:N – Sign 0 is active
ENG 41 1:N – Sign 1 is active
.....
ENG 41 7:N – Sign 7 is active

A non-zero value indicates that the switched sign is active.

42 EXTTMA – Phase Extension Timers Active

BAS:3 ENG 42 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the extension timer or the extension input(s) for that phase are active.

43 GPOUT – Output Port Data

BAS:1 ENG 43 0:XXXXXXXX – Outputs Active on port 0
ENG 43 1:XXXXXXXX – Outputs Active on port 1
.....
ENG 43 30:XXXXXXXX – Outputs Active on port 30

CODE **DESCRIPTION**

45 MTCINF – Master Time Clock Influence

BAS:1 ENG 45 0:76543210 – MTCF7 through to MTCF0

A bit set to '1' indicates which master time clock flags are operative/set. These flags are used in special conditioning to allow construction of time dependant conditioning.

46 HLDELO – Hold Intergreen Extension Loops Occupied

BAS:1 ENG 46 0:76543210 – Loop 7 through to loop 0

A bit set to '1' indicates that the all-red extension input has been seen active during the previous 200ms-sample period.

47 HLDELC – Hold Intergreen Extension Loops Cleared

BAS:1 ENG 47 0:76543210 – Loop 7 through to loop 0

A bit set to '1' indicates that the all-red extension input was still active at the end of the previous 200ms-sample period.

48 UTCFRC – UTC Force Bits

BAS:3 ENG 48 0:10987654 32109876 54321098 76543210

A bit set to '1' indicates force bit active for that stage (31 through to 0).

50 CNDTER – Conditioning Timers Just Terminated

BAS:3 ENG 50 0:10987654 32109876 54321098 76543210 – 31 to 0
ENG 50 4:32109876 54321098 76543210 98765432 – 63 to 32
ENG 50 8:54321098 76543210 98765432 10987654 – 95 to 64
.....
ENG 50 56:98765432 10987654 32109876 54321098 – 479 to 448

A bit set to '1' indicates that the particular timer has just terminated.

For a complete list of the Conditioning Timers, refer to ENG 58.

CODE **DESCRIPTION**

51 ALTMAX – Alternative Max Green Select Flag

BAS:1 ENG 51 0:XXXXXXXX

Where each bit has the following significance:
00000001 – 1st alternate max green set active (MAXSETB)
00000010 – 2nd alternate max green set active (MAXSETC)
00000100 – 3rd alternate max green set active (MAXSETD)
00001000 – 4th alternate max green set active (MAXSETE)
00010000 – 5th alternate max green set active (MAXSETF)
00100000 – 6th alternate max green set active (MAXSETG)
01000000 – 7th alternate max green set active (MAXSETH)
10000000 – UTC forcing MAXSETB on a Pelican

52 UTCAIN – Accepted UTC Inputs

BAS:1 ENG 52 0:XXXXXXXX – UTC Control Word 1
ENG 52 1:XXXXXXXX – UTC Control Word 2
ENG 52 2:XXXXXXXX – UTC Control Word 3
ENG 52 3:XXXXXXXX – UTC Control Word 4

A '1' indicates that the controller has debounced that UTC control bit and the TC bit (if configured) is active.

53 UTCINF – UTC Conditions Influences

BAS:1 ENG 53 0:76543210 – UTC Switch facilities 7 to 0

54 UTCFOP – UTC Force Bits Present Flag

(ANY) ENG 54 0:11111111 => Force bits are present
ENG 54 0:00000000 => No force bits present

55 SBYENB – Standby Enabled Flag

BAS:1 ENG 55 0:76543210

A bit set '1' indicates that part-time mode is being requested on that particular stream (0 to 7).

56 NOTAUT – Mode Select Switch Not In 'NORMAL' Position

(ANY) ENG 56 0:N

A non-zero value indicates that the 'VA', the 'FT' or the 'MANUAL' buttons on the manual panel are currently selected.

A zero value indicates that the 'NORMAL' button is currently selected.

CODE **DESCRIPTION**

58 CNDTMA – Conditioning Timers Active

```
BAS:3  ENG 58  0:10987654 32109876 54321098 76543210 – 31 to 0
       ENG 58  4:32109876 54321098 76543210 98765432 – 63 to 32
       ENG 58  8:54321098 76543210 98765432 10987654 – 95 to 64
       ENG 58 12:76543210 98765432 10987654 32109876 - 127 to 96
       ENG 58 16:98765432 10987654 32109876 54321098 – 159 to 128
       ENG 58 20:10987654 32109876 54321098 76543210 – 191 to 160
       ENG 58 24:32109876 54321098 76543210 98765432 – 223 to 192
       ENG 58 28:54321098 76543210 98765432 10987654 – 255 to 224
       ENG 58 32:76543210 98765432 10987654 32109876 – 287 to 256
       ENG 58 36:98765432 10987654 32109876 54321098 – 319 to 288
       ENG 58 40:10987654 32109876 54321098 76543210 – 351 to 320
       ENG 58 44:32109876 54321098 76543210 98765432 – 383 to 352
       ENG 58 48:54321098 76543210 98765432 10987654 – 415 to 384
       ENG 58 52:76543210 98765432 10987654 32109876 – 447 to 416
       ENG 58 56:98765432 10987654 32109876 54321098 - 479 to 448
```

A bit set to '1' indicates that the particular timer is active.

59 CNDPRV – Conditioning Timers Active on Last 200ms Cycle

```
BAS:3  ENG 59 0:10987654 32109876 54321098 76543210 – 31 to 0
       ENG 59 4:32109876 54321098 76543210 98765432 – 63 to 32
       ENG 59 8:54321098 76543210 98765432 10987654 – 95 to 64
       ..........................................................
       ENG 59 56:98765432 10987654 32109876 54321098 – 479 to 448
```

A bit set to '1' indicates that the particular timer was active on last 200ms cycle.

For a complete list of the Conditioning Timers, refer to ENG 58.

60 AVLMDE – Available Mode Table

```
BAS:1  ENG 60 0:XXXXXXXX  - Not Used
       ENG 60 1:XXXXXXXX  - Fixed Time
       ENG 60 2:XXXXXXXX  - Vehicle Actuated
       ENG 60 3:XXXXXXXX  - CLF (see handset command MTS)
       ENG 60 4:XXXXXXXX  - Manual
       ENG 60 5:XXXXXXXX  - Hurry
       ENG 60 6:XXXXXXXX  - Urban Traffic Control
       ENG 60 7:XXXXXXXX  - Part time
       ENG 60 8:XXXXXXXX  - Start up
       ENG 60 9:XXXXXXXX  - Not Used
       ENG 60 10:XXXXXXXX - Manual Step On Mode
       ENG 60 11:XXXXXXXX - Manual Panel Select Mode Switch
       ENG 60 12:XXXXXXXX - Emergency Vehicle
       ENG 60 13:XXXXXXXX - Bus Priority
```

A mode is not available if any bit is set to a '1'.

Note that '00010000' is set by the special conditioning mnemonics 'FTCONT', 'VACONT', etc. to disable the required mode.

CODE **DESCRIPTION**

62 MANIND – Manual Indications Table

BAS:1 A bit set to '1' indicates that the appropriate LED on the Manual Panel is illuminated.

The actual description of the function of the LED depends on the type of manual panel fitted, either Intersection or Stand-alone Pedestrian.

	Intersection	Stand-alone Ped.
ENG 62 0:00000001	Normal Mode	Stream 0 CPD
ENG 62 0:00000010	Manual Mode	Stream 0 CVE
ENG 62 0:00000100	Fixed Time Mode	Stream 0 VA Mode
ENG 62 0:00001000	VA Mode	Stream 0 FVP Mode
ENG 62 0:00010000	CLF Mode	DFM Reset Confirm
ENG 62 0:00100000	Auxiliary LED 3	Auxiliary LED 3
ENG 62 0:01000000	Awaiting Command	Not Used
ENG 62 0:10000000	Hurry Call Active	Not Used
ENG 62 1:00000001	All Red Confirm	Not Used
ENG 62 1:00000010	Button 1 Confirm	Stream 1 CPD
ENG 62 1:00000100	Button 2 Confirm	Not Used
ENG 62 1:00001000	Button 3 Confirm	Not Used
ENG 62 1:00010000	Button 4 Confirm	Stream 1 CVE
ENG 62 1:00100000	Button 5 Confirm	Not Used
ENG 62 1:01000000	Prohibited Move	Not Used
ENG 62 1:10000000	High Priority Mode	Stream 1 FVP Mode
ENG 62 2:00000001	Button 6 Confirm	Not Used
ENG 62 2:00000010	Button 7 Confirm	Stream 1 VA Mode
ENG 62 2:00000100	Auxiliary LED 1	Auxiliary LED 1
ENG 62 2:00001000	Auxiliary LED 2	Auxiliary LED 2
ENG 62 2:00010000	Not Used	Not Used
ENG 62 2:00100000	Not Used	Not Used
ENG 62 2:01000000	Not Used	Not Used
ENG 62 2:10000000	Cabinet Alarm	Cabinet Alarm

CODE **DESCRIPTION**

63 MANCND – Manual Controls Table Input Data

BAS:1 A bit set to '1' indicates that the appropriate input on the Manual Panel has been pressed (and latched if applicable).

The actual description of the function of the input depends on the type of manual panel fitted, either Intersection or Stand-alone Pedestrian.

	Intersection	Stand-alone Ped.
ENG 62 0:00000001	Normal Mode	Stream 0 CPD
ENG 62 0:00000010	Manual Mode	Stream 0 CVE
ENG 62 0:00000100	Fixed Time Mode	Stream 0 VA/FVP
ENG 62 0:00001000	VA Mode	Not Used
ENG 62 0:00010000	CLF Mode	DFM Reset Button
ENG 62 0:00100000	Spare Switch 3	Spare Switch 3
ENG 62 0:01000000	Not Used	Not Used
ENG 62 0:10000000	Signals On/Off	Signals On/Off
ENG 62 1:00000001	All Red Button	Not Used
ENG 62 1:00000010	Stage 1 Button	Stream 1 CPD
ENG 62 1:00000100	Stage 2 Button	Not Used
ENG 62 1:00001000	Stage 3 Button	Not Used
ENG 62 1:00010000	Stage 4 Button	Stream 1 CVE
ENG 62 1:00100000	Stage 5 Button	Not Used
ENG 62 1:01000000	Not Used	Not Used
ENG 62 1:10000000	Signals On/Off	Signals On/Off
ENG 62 2:00000001	Stage 6 Button	Not Used
ENG 62 2:00000010	Stage 7 Button	Stream 1 VA/FVP
ENG 62 2:00000100	Spare Switch 1	Spare Switch 1
ENG 62 2:00001000	Spare Switch 2	Spare Switch 2
ENG 62 2:00010000	Lamp Test Button	Lamp Test Button
ENG 62 2:00100000	Door Switch	Door Switch
ENG 62 2:01000000	Not Used	Not Used
ENG 62 2:10000000	Signals On/Off	Signals On/Off

65 MTCDEL – MTC Deleted Phases/Stages

BAS:3 ENG 65 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 65 4:10987654 32109876 54321098 76543210

A '1' indicates that the phase/stage has been deleted by the master time clock, i.e. the timetable.

CODE **DESCRIPTION**

67 LPSPRD – Lamp Supply is Present

(ANY) ENG 67 0:N

A zero value indicates that the lamp supply has dropped below the low lamp supply threshold, see LBT etc.

This value will remain unchanged while the lamp supply is switched off (using signals on/off switch for example). It is only updated while the lamp supply is switched on and voltage can be measured.

Also see 'ENG 177 – SWLMPS' which indicates whether the lamp supply is switched on or off.

72 MANSEL – Manual Mode Selected Flag

(ANY) ENG 72 0:N

A non-zero value indicates that Manual Mode has been selected on the manual panel.

76 SSWMDE – Select Switch Mode

BAS:2 ENG 76 0:N

Shows the mode requested by the manual panel, i.e.

ENG 76 0:0 – Normal
ENG 76 0:1 – Fixed Time Mode
ENG 76 0:2 – VA Mode
ENG 76 0:3 – CLF Mode

Also see 'ENG 271 - SSWACT' which indicates whether the above mode is actually running on each of the streams.

77 MANMOP – Manual Mode Operational Flags

(ANY) ENG 77 0:N

A non-zero value indicates that manual mode is operational on at least one stream.

92 CLFFRC – CLF Forces

BAS:3 ENG 92 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 92 4:10987654 32109876 54321098 76543210

A '1' indicates that the phase/stage is being forced by the Cableless Link Facility.

CODE **DESCRIPTION**

93 CLFDEM – CLF Demands

```
BAS:3  ENG 93 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
       ENG 93 4:10987654 32109876 54321098 76543210
```

A '1' indicates that the phase/stage is being demanded by the Cableless Link Facility.

94 CLFKEP – CLF Keeps

```
BAS:3  ENG 94 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
       ENG 94 4:10987654 32109876 54321098 76543210
```

A '1' indicates that the phase/stage is to keep right of way for the Cableless Link Facility.

95 CLFRST – CLF Restricts

```
BAS:3  ENG 95 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
       ENG 95 4:10987654 32109876 54321098 76543210
```

A '1' indicates that the phase/stage is being prevented by the Cableless Link Facility.

96 CCSTT – Call/Cancel State

```
BAS:2  ENG 96 0:N – State of Call/Cancel Unit 0
       ENG 96 1:N – State of Call/Cancel Unit 1
       ....................................
       ENG 96 7:N – State of Call/Cancel Unit 7
```

Where 'N' has the following meanings:

```
 0 – Unit idle
 1 – Input inactive (Unit idle)
 6 – Timing call delay
 7 – Timing call delay (restarted timer)
 8 – Output active (Unit idle)
10 – Input and Output active
13 – Timing cancel delay
15 – Timing cancel delay (restarted timer)
```

98 MNCMPL – Manual Compel

```
BAS:3  ENG 98 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
       ENG 98 4:10987654 32109876 54321098 76543210
```

A '1' indicates that the phase/stage is being requested in manual control for the stage button pressed.

CODE **DESCRIPTION**

99 FTCMPL – Fixed Time Compel

BAS:3 ENG 99 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 99 4:10987654 32109876 54321098 76543210

A '1' indicates that the phase/stage is being requested by fixed time mode.

100 VRDMND – Vehicle Responsive: Demands Present

BAS:3 ENG 100 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 100 4:10987654 32109876 54321098 76543210

A '1' indicates that the phase/stage is being demanded and includes demands from all sources when running in VA mode.

Also see:

ENG 27 – LATCHD	ENG 197 – UNLPUF
ENG 29 – PEDBUT	ENG 216 – WTCTRL
ENG 184 – PEDNOWAIT	ENG 256 – PBKLAT

101 VRKEEP – Vehicle Responsive: Phases to Keep at ROW

BAS:3 ENG 101 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 101 4:10987654 32109876 54321098 76543210

A '1' indicates that the phase/stage should be kept at right of way due to VA or SDE extensions.

102 VRKOVR – Vehicle Responsive: Keep Override

BAS:3 ENG 102 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 102 4:10987654 32109876 54321098 76543210

A '1' indicates that the phase/stage should no longer be kept at right of way since its maximum green timer has expired.

103 VRREST – Vehicle Responsive: Restrictions (Prevents)

BAS:3 ENG 103 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 103 4:10987654 32109876 54321098 76543210

A '1' indicates that the phase/stage should be prevented from appearing at right of way (by special conditioning).

CODE	DESCRIPTION

104 NXTSTG – Next Stage

BAS:2 ENG 104 0:N – The next stage for stream 0
ENG 104 1:N – The next stage for stream 1
.....
ENG 104 7:N – The next stage for stream 7

The values seen here are the same as those seen by the 'STS' handset command.

105 CURSTG – Current Stage

BAS:2 ENG 105 0:N – The current stage for stream 0
ENG 105 1:N – The current stage for stream 1
.....
ENG 105 7:N – The current stage for stream 7

The values show the current stage active on the specified stream (as seen by the STS handset command).
Note that '255' is displayed while the stream is between stages during a stage move.

107 MODE – Displays Current Mode Number

BAS:2 ENG 107 0:N – The current mode for stream 0
ENG 107 1:N – The current mode for stream 1
.....
ENG 107 7:N – The current mode for stream 7

Where 'N' shows the current mode; see the MOD handset command (page 148) for the values.

108 FAZDIS – Phase Display Table

BAS:1 ENG 108 0:XXXXXXXX – Colours for Phase A
ENG 108 1:XXXXXXXX – Colours for Phase B
.....
ENG 108 31:XXXXXXXX – Colours for Phase F2

Where each bit indicates the following:
00000001 – Flashing Green
00000010 – Flashing Amber
00000100 – Flashing Red
00001000 – Not Used
00010000 – Green
00100000 – Amber / Wait Indicator
01000000 – Red
10000000 – Not Used

CODE	DESCRIPTION

116 DFMINH – DFM Inhibit (Priority Units)

(ANY) ENG 116 0:N – Priority Unit 0 Disable By DFM
ENG 116 1:N – Priority Unit 1 Disable By DFM
.....
ENG 116 7:N – Priority Unit 7 Disable By DFM

A non-zero value indicates that the specified priority unit has been disabled due to a fault being detected by the priority DFM system.

117 PRSTAT – Priority Status

BAS:1 ENG 117 0:76543210

A bit set to '1' indicates that there is a demand (or extensions) present for the priority unit (number 7 through to 0).

118 DSRACC – DSR Accepted State

(ANY) ENG 118 0:N

A non-zero value indicates that the handset has been plugged in.

119 CABCTL – Cabinet Alarm Control

BAS:1 ENG 119 0:XXXXXXXX

A bit set to '1' indicates which facility has requested the cabinet alarm (on the manual panel) indicator to be on.

00000001 – DFM fault (and not accepted, see ADF)
00001000 – Priority DFM fault
00010000 – Pelican local link failure

Also see 'ENG 147 – CABLMP' which indicates when special conditioning has requested the indicator on.

122 DFMFLT – Accepted DFM Faults

BAS:1 ENG 122 0:XXXXXXXX – I/O Port 0
ENG 122 1:XXXXXXXX – I/O Port 1
.....
ENG 122 30:XXXXXXXX – I/O Port 30

A bit set to '1' indicates that a DFM fault has been 'accepted' on that input bit on that port, also see the handset command ADF.

CODE **DESCRIPTION**

124 TONORW – Phases Changing To No Right Of Way

BAS:3 ENG 124 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the phase is currently changing from 'at right of way' to 'not at right of way'. Also see page 239.

125 FZTMEX – Phase Terminating With Extensions Active

BAS:3 ENG 125 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the phase has just terminated with its extension timer still running.

126 TERGAP – Phases Terminating On A Gap

BAS:3 ENG 126 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the phase has just terminated and its extension timer was not running.

127 XIGNDM – Extra I/G Demand For Phase By SDE

BAS:3 ENG 127 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that an SDE extra clearance request is active on that phase.

130 PRIINP – Priority Input Active

(ANY) ENG 130 0:N – Priority Unit 0
ENG 130 1:N – Priority Unit 1
.....
ENG 130 7:N – Priority Unit 7

A non-zero value indicates that the priority unit's input is currently active.

131 CURCOM – Current Compensation Times

BAS:2 ENG 131 0:N – Phase A
ENG 131 1:N – Phase B
.....
ENG 131 31:N – Phase F2

The value displayed for each phase is the compensation time that is currently being applied, i.e. being timed off. Note that the value displayed shows the required time and thus does not decrement.

CODE	DESCRIPTION

132 PRIDEM – Priority Demands

(ANY) ENG 132 0:N – Priority Unit 0
ENG 132 1:N – Priority Unit 1
.....
ENG 132 7:N – Priority Unit 7

A non-zero value indicates that there is a demand for the priority unit.

133 PRIEXT – Priority Extensions

(ANY) ENG 133 0:N – Priority Unit 0
ENG 133 1:N – Priority Unit 1
.....
ENG 133 7:N – Priority Unit 7

A non-zero value indicates that there is a priority extension active for the priority unit.

134 INHENA – Inhibit Enable

(ANY) ENG 134 0:N – Priority Unit 0
ENG 134 1:N – Priority Unit 1
.....
ENG 134 7:N – Priority Unit 7

A non-zero value indicates that there is a priority inhibit timer should be enabled for the priority unit.

137 SKPCUR – Phases Skipped Or Curtailed

BAS:3 ENG 137 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Unit 0
ENG 137 4:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Unit 1
.....
ENG 137 28:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Unit 7

A bit set to '1' indicates the demanded phases that were skipped or extended phases that were curtailed, due to the priority movement of the priority unit.

143 PRLTCH – Priority Demand Latched

(ANY) ENG 143 0:N – Priority Unit 0
ENG 143 1:N – Priority Unit 1
.....
ENG 143 7:N – Priority Unit 7

A non-zero value indicates that there is a priority demand latched for the priority unit.

CODE **DESCRIPTION**

144 REVLCH – Revertive Priority Demand Latch

(ANY) ENG 144 0:N – Priority Unit 0
ENG 144 1:N – Priority Unit 1
.....
ENG 144 7:N – Priority Unit 7

A non-zero value indicates that a revertive demand for the priority unit has been latched.

146 SOFCND – Signals Off From Conditioning

(ANY) ENG 146 0:N

A non-zero value indicates that special conditioning has requested that the signals should be switched off.

Note that when special conditioning no longer requests the signals to be switched off, i.e. when this flag is cleared, the signals will switch on through the defined start-up sequence.

147 CABLMP – Cabinet Alarm Lamp Control

(ANY) ENG 147 0:N

A non-zero value indicates that special conditioning has requested that the cabinet alarm should be lit.

Also see 'ENG 119 – CABCTL' which indicates when the software has requested the indicator on.

149 SDEXOP – SDE Extensions Inhibit Mask

BAS:3 ENG 149 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that special conditioning is inhibiting the SDE extension on that phase.

CODE **DESCRIPTION**

150 DISMDE – Disabled Modes On Streams

BAS:1 ENG 150 0:76543210 - Not Used
ENG 150 1:76543210 - Fixed Time
ENG 150 2:76543210 - Vehicle Actuated
ENG 150 3:76543210 - CLF
ENG 150 4:76543210 - Manual
ENG 150 5:76543210 - Hurry
ENG 150 6:76543210 - Urban Traffic Control
ENG 150 7:76543210 - Part time
ENG 150 8:76543210 - Start up
ENG 150 9:76543210 - Not Used
ENG 150 10:76543210 – Manual Step On Mode
ENG 150 11:76543210 – VA/FT/CLF Selected On Man' Panel
ENG 150 12:76543210 – Emergency Vehicle
ENG 150 13:76543210 – Bus Priority

A bit set to '1' indicates that special conditioning has disabled the mode on that particular stream (0-7).

151 CNDARY – Special Conditioning Array

(ANY) ENG 151 0 ...

Special conditioning items are overlaid on this array so that the values can be read and written to from special conditioning.

152 FLFLGS – Current Fault Flags

BAS:2 ENG 152 0:N – Fault flag 0
ENG 152 1:N – Fault flag 1
.....
ENG 152 63:N – Fault flag 63

This array indicates currently active faults (or those that were detected as active on power-up and will not be re-tested until the next power-up). Whilst faults are set in this array, the corresponding fault flag entry (as displayed on the handset using FLF or FFS) cannot be cleared, see section 4 starting on page 26. Faults that can always be manually cleared by RFL=1 may never appear set in this data.

153 FLDATA – Current Fault Data

BAS:1 ENG 153 0:XXXXXXXX – Fault data byte 0
ENG 153 1:XXXXXXXX – Fault data byte 1
.....
ENG 153 249:XXXXXXXX – Fault data byte 249

The current fault data (FLD/FDS) associated with the current fault flags described in ENG 152.

CODE **DESCRIPTION**

154 TORW – Phases Changing To Right Of Way

BAS:3 ENG 154 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the phase is currently changing from to right of way. Also see page 239.

155 OIREQ – Phase And Stage Requests Per Mode

BAS:3 Phase/Stage requests for each mode:

```
FT:      ENG 155   8:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155  12:10987654 32109876 54321098 76543210

VA:      ENG 155  16:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155  20:10987654 32109876 54321098 76543210

CLF:     ENG 155  24:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155  28:10987654 32109876 54321098 76543210

Manual:  ENG 155  32:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155  36:10987654 32109876 54321098 76543210

Hurry:   ENG 155  40:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155  44:10987654 32109876 54321098 76543210

UTC:     ENG 155  48:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155  52:10987654 32109876 54321098 76543210

P/Time:  ENG 155  56:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155  60:10987654 32109876 54321098 76543210

S/Up:    ENG 155  64:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155  68:10987654 32109876 54321098 76543210

FVP:     ENG 155  72:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155  76:10987654 32109876 54321098 76543210

StepOn:  ENG 155  80:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155  84:10987654 32109876 54321098 76543210

Em/Veh:  ENG 155  96:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155 100:10987654 32109876 54321098 76543210

Prior:   ENG 155 104:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155 108:10987654 32109876 54321098 76543210

Pel/VA:  ENG 155 112:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155 116:10987654 32109876 54321098 76543210
```

CODE **DESCRIPTION**

156 OIKEEP – Phase And Stage Keeps Per Mode

BAS:3 Phases/stages to keep right of way, e.g. due to VA extension timers, for each mode.

Format as for ENG 155 (OIREQ).

157 OIKEOR – Phase And Stage Keep Overrides Per Mode

BAS:3 Phases/stages with keeps overridden, e.g. due to max timers expiring, for each mode.

Format as for ENG 155 (OIREQ).

158 OIREST – Phase And Stage Restrictions Per Mode

BAS:3 Phases/stages restricted, e.g. by special conditioning or the master time clock, for each mode.

Format as for ENG 155 (OIREQ).

159 OICDEM – Operational Influences Combined Phase Demands

BAS:3 ENG 159 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 159 4:10987654 32109876 54321098 76543210

Operational influences (OIDEM) combined using the modes actually running on each of the streams.

160 OICREQ – Operational Influences Combined Phase Request

BAS:3 ENG 160 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 160 4:10987654 32109876 54321098 76543210

Operational influences (OIREQ) combined using the modes actually running on each of the streams.

161 OICKEEP – Operational Influences Combined Phase Keeps

BAS:3 ENG 161 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 161 4:10987654 32109876 54321098 76543210

Operational influences (OIKEEP) combined using the modes actually running on each of the streams.

CODE **DESCRIPTION**

162 OICKEOR – Operational Influences Combined Keep Override

BAS:3 ENG 162 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 162 4:10987654 32109876 54321098 76543210

Operational influences (OIKEOR) combined using the modes actually running on each of the streams.

163 OICREST – Operational Influences Combined Restrictions

BAS:3 ENG 163 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 163 4:10987654 32109876 54321098 76543210

Operational influences (OIREST) combined using the modes actually running on each of the streams.

164 TMRSEC – Timer Seconds Array

BAS:2 ENG 164 0:N – Seconds left in timer 0
ENG 164 1:N – Seconds left in timer 1
Etc...

These timers are used by various facilities within the controller and are allocated as follows:

```
  0 to 31  = 32 Phase minimum green timers
 32 to 63  = 32 Phase green extension timers
 64 to 95  = 32 Phase green maximum timers
 96 to 127 = 32 Phase delay timers
128 to 159 = 32 Phase lamp sequencing timers
160 to 191 = 32 Phase intergreen timers
192 to 223 = 32 Phase secondary intergreen timers
224 to 231 =  8 Hurry call delay timers
232 to 239 =  8 Hurry call hold timers
240 to 247 =  8 Hurry call prevent timers
248 to 255 =  8 Call/Cancel timers
256 to 263 =  8 Priority extension timers
264 to 271 =  8 Priority maximum timers
272 to 279 =  8 Priority inhibit timers
280 to 284 =  5 Internal timers
285 to 316 = 32 Phase priority compensation timers
317 to 324 =  8 Fixed time timers
325 to 332 =  8 Pedestrian window timers
333 to 340 =  8 Hold intergreen maximum timers
341 to 348 =  8 Hold intergreen extension timers
349 to 356 =  8 Supplementary intergreen ext. timers
357 to 364 =  8 Supplementary intergreen max. timers
365 to 396 = 32 Conditioning timers  0 to 31
```

CODE **DESCRIPTION**

```
 397 to 428 = 32 Conditioning timers 32 to 63
 429 to 460 = 32 Conditioning timers 64 to 95
 461 to 468 =  8 Manual step-on timers
 469 to 724 = 256 Input extension timers
 725 to 756 = 32 Push-button demand extension timers
 757 to 788 = 32 Pedestrian demand delay timers
 789 to 820 = 32 Conditioning timers 96 to 127
 821 to 852 = 32 Conditioning timers 128 - 159
 853 to 884 = 32 Conditioning timers 160 – 191
 885 to 916 = 32 Conditioning timers 192 – 223
 917 to 948 = 32 Conditioning timers 224 – 255
 949 to 980 = 32 Conditioning timers 256 – 287
 981 to 1012 = 32 Conditioning timers 288 – 319
1013 to 1044 = 32 Conditioning timers 320 – 351
1045 to 1076 = 32 Conditioning timers 352 to 383
1077 to 1108 = 32 Conditioning timers 384 to 415
1109 to 1140 = 32 Conditioning timers 416 to 447
1141 to 1172 = 32 Conditioning timers 448 to 479
```

Also see 'ENG 165 – TMRSTU' which shows the sub-seconds and status flags for each timer.

```
 165   TMRSTU – Timer Status Array

BAS:1  ENG 165   0:XXXXXXXX – Status of timer 0
       ENG 165   1:XXXXXXXX – Status of timer 1
       Etc...
```

This array holds the sub-seconds and status flags for each of the timers described in ENG 164 where each bit has the following meaning:

```
-----000 = Timer sub-seconds value 0.0 seconds
-----001 = Timer sub-seconds value 0.2 seconds
-----010 = Timer sub-seconds value 0.4 seconds
-----011 = Timer sub-seconds value 0.6 seconds
-----100 = Timer sub-seconds value 0.8 seconds

001----- = Timer active flag
010----- = Timer held flag
100----- = Timer expired flag
```

CODE **DESCRIPTION**

167 SCRTCH – Scratch Pad For Special Conditioning

BAS:1 OR BAS:2 This area is used special conditioning for its scratch bits, etc., which have been allocated as follows:

ENG 167 0:76543210 – Scratch Bits: SCRT0 to SCRT7
ENG 167 1:54321098 – Scratch Bits: SCRT8 to SCRT15

ENG 167 2:76543210 – Rough Bits: ROUGH0 to ROUGH7
ENG 167 3:54321098 – Rough Bits: ROUGH8 to ROUGH15

The following blocks can either be accessed as scratch bits, 1SCRT0, etc., which are best viewed using BAS:1, or as scratch bytes, 1SCRTCH0, etc., which are best viewed using BAS:2

	SCRATCH BITS			BYTES
ENG 167 4:76543210 –	1SCRT0	to 1SCRT7	or	1SCRTCH0
ENG 167 5:54321098 –	1SCRT8	to 1SCRT15	or	1SCRTCH1
ENG 167 6:32109876 –	1SCRT16	to 1SCRT23	or	1SCRTCH2
ENG 167 7:10987654 –	1SCRT24	to 1SCRT31	or	1SCRTCH3
ENG 167 8:98765432 –	1SCRT32	to 1SCRT39	or	1SCRTCH4
ENG 167 9:76543210 –	1SCRT40	to 1SCRT47	or	1SCRTCH5
ENG 167 10:54321098 –	1SCRT48	to 1SCRT55	or	1SCRTCH6
ENG 167 11:32109876 –	1SCRT56	to 1SCRT63	or	1SCRTCH7
ENG 167 12:10987654 –	1SCRT64	to 1SCRT71	or	1SCRTCH8
ENG 167 13:98765432 –	1SCRT72	to 1SCRT79	or	1SCRTCH9
ENG 167 14:76543210 –	1SCRT80	to 1SCRT87	or	1SCRTCH10
ENG 167 15:54321098 –	1SCRT88	to 1SCRT95	or	1SCRTCH11
ENG 167 16:32109876 –	1SCRT96	to 1SCRT103	or	1SCRTCH12
ENG 167 17:10987654 –	1SCRT104	to 1SCRT111	or	1SCRTCH13
ENG 167 18:98765432 –	1SCRT112	to 1SCRT119	or	1SCRTCH14
ENG 167 19:76543210 –	1SCRT120	to 1SCRT127	or	1SCRTCH15
ENG 167 20:54321098 –	1SCRT128	to 1SCRT135	or	1SCRTCH16
ENG 167 21:32109876 –	1SCRT136	to 1SCRT143	or	1SCRTCH17
ENG 167 22:10987654 –	1SCRT144	to 1SCRT151	or	1SCRTCH18
ENG 167 23:98765432 –	1SCRT152	to 1SCRT159	or	1SCRTCH19
ENG 167 24:76543210 –	1SCRT160	to 1SCRT167	or	1SCRTCH20
ENG 167 25:54321098 –	1SCRT168	to 1SCRT175	or	1SCRTCH21
ENG 167 26:32109876 –	1SCRT176	to 1SCRT184	or	1SCRTCH22
ENG 167 27:10987654 –	1SCRT184	to 1SCRT192	or	1SCRTCH23
ENG 167 28:98765432 –	1SCRT192	to 1SCRT199	or	1SCRTCH24
ENG 167 29:76543210 –	1SCRT200	to 1SCRT207	or	1SCRTCH25
ENG 167 30:54321098 –	1SCRT208	to 1SCRT215	or	1SCRTCH26
ENG 167 31:32109876 –	1SCRT216	to 1SCRT223	or	1SCRTCH27
ENG 167 32:10987654 –	1SCRT224	to 1SCRT231	or	1SCRTCH28
ENG 167 33:98765432 –	1SCRT232	to 1SCRT239	or	1SCRTCH29
ENG 167 34:76543210 –	1SCRT240	to 1SCRT247	or	1SCRTCH30
ENG 167 35:54321098 –	1SCRT248	to 1SCRT255	or	1SCRTCH31

Continued overleaf...

CODE **DESCRIPTION**

167 (CONT.) Following that block of 32 scratch bytes (256 scratch bits) is a second identically structured block giving even more scratch bits and bytes...

	SCRATCH BITS		BYTES
ENG 167 36:76543210 –	2SCRT0	to 2SCRT7	or 2SCRTCH0
ENG 167 37:54321098 –	2SCRT8	to 2SCRT15	or 2SCRTCH1
ENG 167 38:32109876 –	2SCRT16	to 2SCRT23	or 2SCRTCH2
ENG 167 39:10987654 –	2SCRT24	to 2SCRT31	or 2SCRTCH3
ENG 167 40:98765432 –	2SCRT32	to 2SCRT39	or 2SCRTCH4
ENG 167 41:76543210 –	2SCRT40	to 2SCRT47	or 2SCRTCH5
ENG 167 42:54321098 –	2SCRT48	to 2SCRT55	or 2SCRTCH6
ENG 167 43:32109876 –	2SCRT56	to 2SCRT63	or 2SCRTCH7
ENG 167 44:10987654 –	2SCRT64	to 2SCRT71	or 2SCRTCH8
ENG 167 45:98765432 –	2SCRT72	to 2SCRT79	or 2SCRTCH9
ENG 167 46:76543210 –	2SCRT80	to 2SCRT87	or 2SCRTCH10
ENG 167 47:54321098 –	2SCRT88	to 2SCRT95	or 2SCRTCH11
ENG 167 48:32109876 –	2SCRT96	to 2SCRT103	or 2SCRTCH12
ENG 167 49:10987654 –	2SCRT104	to 2SCRT111	or 2SCRTCH13
ENG 167 50:98765432 –	2SCRT112	to 2SCRT119	or 2SCRTCH14
ENG 167 51:76543210 –	2SCRT120	to 2SCRT127	or 2SCRTCH15
ENG 167 52:54321098 –	2SCRT128	to 2SCRT135	or 2SCRTCH16
ENG 167 53:32109876 –	2SCRT136	to 2SCRT143	or 2SCRTCH17
ENG 167 54:10987654 –	2SCRT144	to 2SCRT151	or 2SCRTCH18
ENG 167 55:98765432 –	2SCRT152	to 2SCRT159	or 2SCRTCH19
ENG 167 56:76543210 –	2SCRT160	to 2SCRT167	or 2SCRTCH20
ENG 167 57:54321098 –	2SCRT168	to 2SCRT175	or 2SCRTCH21
ENG 167 58:32109876 –	2SCRT176	to 2SCRT184	or 2SCRTCH22
ENG 167 59:10987654 –	2SCRT184	to 2SCRT192	or 2SCRTCH23
ENG 167 60:98765432 –	2SCRT192	to 22CRT199	or 2SCRTCH24
ENG 167 61:76543210 –	2SCRT200	to 2SCRT207	or 2SCRTCH25
ENG 167 62:54321098 –	2SCRT208	to 2SCRT215	or 2SCRTCH26
ENG 167 63:32109876 –	2SCRT216	to 2SCRT223	or 2SCRTCH27
ENG 167 64:10987654 –	2SCRT224	to 2SCRT231	or 2SCRTCH28
ENG 167 65:98765432 –	2SCRT232	to 2SCRT239	or 2SCRTCH29
ENG 167 66:76543210 –	2SCRT240	to 2SCRT247	or 2SCRTCH30
ENG 167 67:54321098 –	2SCRT248	to 2SCRT255	or 2SCRTCH31

168 FLAFLF – Fault Flags Active To Cause Flashing

(ANY) ENG 168 0:N

A non-zero value indicates that fault flag are set that have been configured to extinguish the signals and switch on the fail flasher.

Note that the firmware just extinguishes the signals. Special conditioning is required to actually switch on the fail flasher if required.

CODE **DESCRIPTION**

169 FLFCOM – Fault Flags Combination Set

(ANY) ENG 169 0:N

A non-zero value indicates that fault flags are set that have been configured to perform special events controlled by special conditioning, e.g. to return a modified controller fault 'CF' reply bit.

170 PRD1EX – 1st Priority Delay Timer Expired Flag

BAS:1 ENG 170 0:76543210

A bit set to '1' indicates the priority units on which 1st delay timers have expired.

176 SYSLED – System Error LED Status

(ANY) ENG 176 0:N

A non-zero value indicates that the system error LED is requested to be on, i.e. one or more faults flags are set.

177 SWLMPS – Software Lamp State Flag

(ANY) ENG 177 0:N

A non-zero value indicates the software expects the lamp supply to be on. This normally matches the 'LMPON' requested state except for slight delays in switching the lamp supply relays on and off and during a relay test (see 'RRT') when 'SWLMPS' will show the supply switching off temporarily.

Also see:

'ENG 67 – LPSPRD' which indicates whether the lamp supply is present, i.e. is not too low, and

'ENG 188 – LMPON' which indicates the lamp supply state requested by the software.

CODE **DESCRIPTION**

180 CNGTYP – Red To Green Change Type For Pelican Ped

BAS:2 ENG 180 0:N – Change type for stream 0
ENG 180 1:N – Change type for stream 1
.....
ENG 180 7:N – Change type for stream 7

This array is set up by the vehicle responsive module to indicate which type of stage change is in progress on the pelican stream. The values are used by the lamp sequencing module to select the appropriate PAR all red time:

Value	Stage Change Type
0	Gap change in VA mode
1	MAX change in VA mode
2	FVP mode
3	UTC active
4	Local link/CLF window active

182 SCINH – Pelican UTC Vehicle Extension Inhibit

BAS:3 ENG 182 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the UTC vehicle Extension Inhibit (SC) is active on the vehicle phase of a stand-alone pedestrian stream. Set up by Special Conditioning.

183 LLDMD – Pelican Local Link Pedestrian Demands

BAS:3 ENG 183 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

Where a bit set to '1' indicates a local link pedestrian demand for that particular phase.

184 PEDNOWAIT – Ped. Demands Which Do Not Light The Waits

BAS:3 ENG 184 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates a pedestrian demand (from special conditioning) that does not light the wait indicator on that phase.

Also see:
ENG 27 – LATCHD
ENG 29 – PEDBUT
ENG 100 - VRDMND
ENG 197 – UNLPUF
ENG 216 – WTCTRL
ENG 256 – PBKLAT

CODE **DESCRIPTION**

187 RLMMSK – Phase Masked Out By Red Lamp Monitoring

BAS:3 ENG 187 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '0' indicates that the phase has been blacked-out following a 2nd red lamp fault.

Also see 'ENG 215 – LMUINH' for phases inhibited by red lamp monitoring.

188 LMPON – Lamp On/Off Request

(ANY) ENG 118 0:N

A non-zero value indicates that the software is requesting the lamp supply should be switched on.

Also see:

'ENG 67 – LPSPRD' which indicates whether the lamp supply is present, i.e. is not too low, and

'ENG 177 – SWLMPS' which indicates whether the lamp supply is switched on or off.

189 LMPDIM – Lamp Dim/Bright Request

(ANY) ENG 189 0:N

A non-zero value indicates that the software is requesting the lamp supply to be dimmed.

190 UTCINH – UTC Pedestrian And Extension Inhibit

BAS:3 ENG 190 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that demands and extensions for that phase are inhibited, normally used by the pelican PV bit.

191 LNKINH – Local Link Ped. Demand And Extension Inhibit

BAS:3 ENG 191 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

As 'ENG 190 – UTCINH', except this is due to the local link PV1 input.

CODE **DESCRIPTION**

192 CLFINH – CLF Pedestrian Inhibit

BAS:3 ENG 192 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set '1' indicates that the pedestrian phase has been inhibited by the CLF inhibit pedestrian phase influence.

194 PRSLMP – Present Street Lamp States

BAS:3 ENG 194 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Reds
ENG 194 4:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Ambers
ENG 194 8:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Greens

A bit set to '1' indicates that the phase and colour has been requested on. Also see "ENG 268 – PRSFLS".

Note that this information will reflect any flashing state as occurring on the street and if the signals are switched off, the display will be all zeros.

195 SPCMPL – Step On Compel

BAS:3 ENG 195 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 195 4:10987654 32109876 54321098 76543210

A bit set to '1' shows the demanded phases (usually none) and stages (usually the next stage) used by the manual step-on facility.

196 ALTDFM – Alternative DFM Timeset Selected Flags

BAS:1 ENG 196 0:00000XXX

This item shows which alternate DFM timeset is currently active:

00000000 – DFM timeset A is active
00000001 – DFM timeset B is active
00000010 – DFM timeset C is active
00000100 – DFM timeset D is active

197 UNLPUF – Unlatched Puffin Phased Demands

BAS:3 ENG 197 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that there is an unlatched 'Puffin' demand for that pedestrian phase, i.e. a demand processed using kerbside detector inputs and/or a pedestrian demand delay.

Also see:

ENG 27 – LATCHD	ENG 184 – PEDNOWAIT
ENG 29 – PEDBUT	ENG 216 – WTCTRL
ENG 100 - VRDMND	ENG 256 – PBKLAT

CODE **DESCRIPTION**

211 RLM_DELAY_STATE – Enhanced RLM Phase Delays Running

BAS:3 ENG 211 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the red lamp monitoring facility is currently delaying the phase.

215 LMUINH – Phases Inhibited By Red Lamp Monitoring

BAS:3 ENG 215 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the red lamp monitoring facility is currently inhibiting the phase.

Also see 'ENG 240 – LMUSTG' for the stages inhibited and 'ENG 187 – RLMMSK' for phases blacked out by red lamp monitoring.

216 WTCTRL – Wait Indicator Control

BAS:3 ENG 216 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates the phase's wait indicator is being requested on, either by special conditioning or by the firmware. However, demands handled by PBKLAT do not appear in WTCTRL.

Also see:

ENG 27 – LATCHD	ENG 184 – PEDNOWAIT
ENG 29 – PEDBUT	ENG 197 – UNLPUF
ENG 100 – VRDMND	ENG 256 – PBKLAT

218 ENT_TIM_CTRL – CLF Entry Timer Control Indication

BAS:2 ENG 218 0:N

This value shows the state of the CLF entry timer:

ENG 218 0:0 – Entry timer is idle
ENG 218 0:1 – Entry timer is active
ENG 218 0:2 – Entry timer has terminated

219 EXIT_TIM_CTRL – CLF Exit Timer Control Indication

BAS:2 ENG 219 0:N

This value shows the state of the CLF exit timer:

ENG 219 0:0 – Exit timer is idle
ENG 219 0:1 – Exit timer is active
ENG 219 0:2 – Exit timer has terminated

CODE	DESCRIPTION
227	dprcpy – Dual Port RAM Copy
(VARIOUS)	The Dual Port RAM is the area of shared memory between the controller's main processor and the phase bus processor used to pass messages between the two. This item allows the messages received from the phase bus processor to be examined. Many items are only of use to Siemens Engineering, however some may be useful and these are explained below:
227.0	dprcpy.compatibility
BAS:2	ENG 227 0:X ENG 227 1:Y These items show the phase bus processor's major (X) and minor (Y) compatibility numbers. Currently the only value of 'X' accepted by the main processor is '1'. The value of 'Y' indicates the optional features available in the phase bus processor firmware. If the compatibility values are not correct, FLF 2:253 is set, see page 33.
227.14	dprcpy.rep.message_code
BAS:2	ENG 227 14:N This item shows the message code number. The only valid message code currently expected by main processor is '10' otherwise the message is ignored and the counter in ENG 235 is incremented.
227.15	dprcpy.rep.watchdog
BAS:2	ENG 227 15:N This item is incremented by the phase bus processor in each message to show that it is still functioning; otherwise the main processor would ignore the message and increment the counter in ENG 235.
227.16	dprcpy.rep.state
BAS:2	ENG 227 16:N This item shows the running state of the phase bus processor. Currently defined states are: 1 – Start-up mains averaging 2 – Start-up waiting for go from main processor 3 – Start-up fast config check 4 – System active

CODE	DESCRIPTION

227.18 dprcpy.rep.zxo_missed

(ANY) ENG 227 18:N

A non-zero value indicates that the phase bus processor 'missed', i.e. did not detect, the mains zero crossover signal on the previous mains cycle. Also see ENG 235 14.

227.44 dprcpy.rep.curr_red1

BAS:2 ENG 227 44:N – Phase A
ENG 227 45:N – Phase B
.....
ENG 227 75:N – Phase F2

These values show the last red current readings for the first channels of phases A to F2. The value would normally be '255' if one or more lamps were connected.

227.76 dprcpy.rep.curr_red2

BAS:2 ENG 227 76:N – Phase A
ENG 227 77:N – Phase B
.....
ENG 227 107:N – Phase F2

These values show the last red current readings for the second channels of phases A to F2. The value would normally be '255' if one or more lamps were connected.

227.110 dprcpy.rep.tot_curr

ENG 227 110/1:N – Sensor 1 (Normally Phase A)
BAS:2 ENG 227 112/3:N – Sensor 2 (Normally Phase B)
.....
ENG 227 172/3:N – Sensor 32 (Normally Phase F2)

These 16-bit words show the live current readings taken on each of the 32 on-board sensors where a count of 217 is normally equivalent to 1 Amp rms. [LV Controllers only]

Unlike KES (which only shows the readings actually processed by the lamp monitor) these readings are taken continuously, regardless of the state of the signals.

CODE **DESCRIPTION**

227. 176 BAS:2 dprcpy.rep.analog

ENG 227 176/7:N – Sensor 33 196/7:N – Sensor 41
ENG 227 178/9:N – Sensor 34 198/9:N – Sensor 42
ENG 227 180/1:N – Sensor 35 200/1:N – Sensor 43
ENG 227 182/3:N – Sensor 36 202/3:N – Sensor 44
ENG 227 184/5:N – Not Used 204/5:N – Not Used
ENG 227 186/7:N – Sensor 37 206/7:N – Sensor 45
ENG 227 188/9:N – Sensor 38 208/9:N – Sensor 46
ENG 227 190/1:N – Sensor 39 210/1:N – Sensor 47
ENG 227 192/3:N – Sensor 40 212/3:N – Sensor 48
ENG 227 194/5:N – Not Used

These 16-bit words show the live current readings taken on each of the 16 external sensors where a count of 217 is normally equivalent to 1 Amp rms. [LV Controllers only]

Unlike KES (which only shows the readings actually processed by the lamp monitor) these readings are taken continuously, regardless of the state of the signals.

227. 224 BAS:2 dprcpy.rep.adc_test

These values show the results from the ADC tests which the phase bus processor has performed on each of the lamp switch cards at both the positive and negative mains peaks.

The data starts at offset 244 with the negative peak readings for the first lamp switch card:

ENG 227 224/5:N – Test 0.0v – Card 0 – Negative Peak
ENG 227 226/7:N – Test 2.5v – Card 0 – Negative Peak
ENG 227 228/9:N – Test 5.0v – Card 0 – Negative Peak

The positive peak readings for this card start at:
ENG 227 230/1:N – Test 0.0v – Card 0 – Positive Peak

And the readings for the other three cards start at:
ENG 227 236/7:N – Test 0.0v – Card 1 – Negative Peak
ENG 227 248/9:N – Test 0.0v – Card 2 – Negative Peak
ENG 227 260/1:N – Test 0.0v – Card 3 – Negative Peak

228 BAS:3 cor_errors_confirmed – Correspondence Errors Confirmed

ENG 228 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Reds
ENG 228 4:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Ambers
ENG 228 8:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Greens

A bit set '1' indicates that a correspondence fault has been confirmed against that phase and colour, but the controller has been configured to continue normal operation, i.e. problems with the reds, ambers or switched signs, but not the greens.

Also see the description of FLF 3 on page 34.

CODE **DESCRIPTION**

230 background_checksum_counter – Monitor CRC Routines

BAS:2 ENG 230 0:N – Primary CPU Configuration Data (Fixed)
ENG 230 1:N – Primary CPU Configuration Data (Timings)
ENG 230 2:N – Primary CPU Firmware
ENG 230 3:N – Application Configuration Data (Fixed)
ENG 230 4:N – Application Configuration Data (Timings)

Each byte counter is incremented after each block of data within each particular area has been read by the background checksum routines showing that the checksum check routines are active.

231 LMPMON_flashing_config_fault

BAS:2 ENG 231 0:N

This item counts the number of times monitoring of a flashing aspect by one or more of the sensors had to be aborted because too many were flashing simultaneously.

232 LMPMON_confirmed_drops – Confirmed Lamp Faults

BAS:2 ENG 232 2:N – Sensor 1, i.e. Phase A
ENG 232 4:N – Sensor 2, i.e. Phase B
.....
ENG 232 64:N – Sensor 32, i.e. Phase F2

These values show the number of load drops that the lamp monitor has confirmed on each phase's red, i.e. how many times the lamp monitor has confirmed a drop in current.

The red lamp monitor uses this information to help it distinguish between a 1st and a 2nd red lamp failure; i.e. two or more confirmed drops in current will generate a 2nd red lamp fault.

Note that the red lamp monitor will also generate a 2nd red lamp fault if the load dropped, i.e. the value in KLD, is more than 150% of configured maximum size of any red lamp.

237 TCSYCF – Time Clock UTC Sync. Flag

(ANY) ENG 237 0:N

A non-zero value indicates that the UTC clock sync. Input has just been accepted. Normally this flag drives the confirm bit directly if configured, but this item allows special conditioning to detect when the bit would have been set and thus return a modified confirm bit instead.

CODE **DESCRIPTION**

238 RTCONF – Real Time Clock Confirm Flag

(ANY) ENG 238 0:N

A non-zero value indicates that the UTC 'clock confirm time' has been reached. Normally this flag drives the confirm bit directly if configured, but this item allows special conditioning to detect when the bit would have been set and thus return a modified confirm bit instead.

239 FTCM_active – Fixed Time To Current Maximums Active

BAS:1 ENG 239 0:76543210

A bit set to '1' indicates that Fixed Time to Current Maximums is active on that stream (0-7). Note that Fixed Time to Current Maximums actually uses VA mode although the manual panel and the handset commands MOD and STS show the mode as Fixed Time.

240 LMUSTG – Stages Inhibited By Red Lamp Monitoring

BAS:3 ENG 240 0:10987654 32109876 54321098 76543210

A bit set to '1' indicates that red lamp monitoring has inhibited all the phases; see ENG 215, in that stage.

241 JNC_checksum – Junction Data Checksum

BAS:0 ENG 241 0:XX
ENG 241 1:XX
ENG 241 2:XX
ENG 241 3:XX

This four-byte item is the checksum for the junction configuration data held in the battery backed RAM. This data is not changeable using the handset.

242 SAY_checksum – Timing Data Checksum

BAS:0 ENG 242 0:XX
ENG 242 1:XX
ENG 242 2:XX
ENG 242 3:XX

This four-byte item is the checksum for the timing configuration data held in the battery backed RAM. Data within this area can be changed using the handset

CODE **DESCRIPTION**

243 PHASE_ENABLES – Phases Enabled

BAS:3 ENG 243 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the phase is either fixed in the current stage, or is demand dependant and a demand has been accepted, and the phase is not inhibited by the red lamp monitor. Also see page 239.

244 INTERGREENS_EXPIRED – Intergreens Expired

BAS:3 ENG 244 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the intergreen timers have finished for that phase and remains set while any red lamp monitor delays are being timed off or the phase is not to appear, i.e. is not in PHASE_ENABLES.

Also see page 239.

245 LOSING_PHASES – Phases Which Lost Right Of Way

BAS:3 ENG 245 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the phase lost right of way during the stage movement. Like ENG 13, this information is set-up as the controller decides to make the stage move, but, unlike ENG 13, this item remains set until the next stage change.

246 RLM_DELAYS_EXPIRED – RLM Delay Timers Expired

BAS:3 ENG 246 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the red lamp monitor delay timer has expired (also see ENG 244). The bit is cleared when the phase is sent to green and thus it may only be set briefly. Also see page 239.

247 GAINING_PHASES – Phases Which May Gain Right Of Way

BAS:3 ENG 247 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the phase may gain right of way during the current stage movement. The bit is set at the start of the stage movement. It remains set until the phase actually starts to move to right of way, e.g. starts its red/amber period or the phase can no longer appear because the controller has now moved to a stage which no longer contains the phase. Also see page 239.

CODE **DESCRIPTION**

248 GPIPX – General Purpose Inputs Extended

BAS:1 ENG 248 0:XXXXXXXX – Extended inputs on port 0
ENG 248 1:XXXXXXXX – Extended inputs on port 1
.....
ENG 248 30:XXXXXXXX – Extended inputs on port 30

A bit set to '1' indicates that, that I/O line on the port is currently active, i.e. similar to 'ENG 25 – GPIN1', or that the input has been active and is currently running the extension time configured on that input using the handset command IPX.

The bit is cleared when the input goes inactive and the extension time, if any, has expired.

249 RIPCNG – Ripple Change Active

BAS:1 ENG 249 0:76543210

A bit set to '1' indicates that a ripple change is currently active on that stream (0-7).

The bit is set when the controller makes the first stage change while one stage change is already in progress and remains set until the controller finally resides in a stage.

250 RIPSTG – Stages Terminated By The Ripple Change

BAS:3 ENG 250 0:10987654 32109876 54321098 76543210

A bit set to '1' indicates that the controller has terminated that stage during the current ripple stage. It is used internally to check that all the stage moves from these stages to the suggested stage are not restricted since, to the street, it may look like the controller has performed any one of these stage moves.

251 LOSRWD – Phases To Lose Right Of Way Delayed

BAS:3 ENG 251 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that this phase is to lose right of way during the current stage movement and its losing phase delay (if any) has expired, in which case the phase would normal lose right of way immediately and the bit would not be seen set. The bit will only remain set if the phase is configured as termination type 1 or 2 and the phase is waiting until its associated phase gains or leaves right of way.

Also see ENG 245 – 'LOSING_PHASES' and page 239.

CODE **DESCRIPTION**

252 ESP_Active – Enhanced Serial Port Active

(ANY) ENG 252 0:N

A non-zero value indicates that the enhanced serial link to a Siemens OMU unit is active.

254 PBNACT – Push-button Demands Active

BAS:3 ENG 254 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

Only for phases with kerbsides or ped demand delay.
Push-button unlatched demands seen with active kerbside inputs which will result in an unlatched demand.

255 KBSACT – Kerbside Inputs Active

BAS:3 ENG 255 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that one or more kerbside inputs (or their extensions) are active on that phase. Note: This information is only set-up for phases with kerbside detectors or pedestrian demand delays.

256 PBKLAT – Push-button and Kerbside Latch

BAS:3 ENG 256 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

Push-button/kerbside latch. Set when PBNACT set and cleared when KBSACT cleared and pedestrian demand extension (PDX) expires. Also set while PBNLAT is set. This item illuminates the wait indicators but does not demand the phase.

Also see:
ENG 197 – UNLPUF

257 ONCACT – On-crossing Detectors Active

BAS:3 ENG 257 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that one or more on-crossing detectors for the phase are active. The bit is cleared when all of the detectors assigned to the phase go inactive and their extension times have expired.

CODE **DESCRIPTION**

258 ONCBAD – On-crossing Detector Faulty

BAS:3 ENG 258 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that one or more of the configured detectors on this phase have not been seen active since the last pedestrian clearance period. The clearance period is therefore being forced to run to its maximum. Also see 'ENG 259 – ONCDOK' following...

259 ONCDOK – On-crossing Detector Checking

BAS:1

ENG 259 0:0000XXXX – inputs for phase A
ENG 259 1:0000XXXX – inputs for phase B
.....
ENG 259 31:0000XXXX – inputs for phase F2

A bit set to '1' indicates that the detector has been seen active since the end of the previous clearance period. If a bit is still clear when the clearance period starts, ONCBAD is set for the phase and the clearance period is forced to run to its maximum.

260 PBTTMA – Pedestrian Minimum Clearance Period Active

BAS:3 ENG 260 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the PBT pedestrian minimum clearance period is running for that phase. The bit is cleared when this period is no longer running.

261 CMXTMA – Pedestrian Extendable Clearance Period Active

BAS:3

ENG 261 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the CMX pedestrian extendable clearance period is running for that phase. The bit is cleared when this period is no longer running.

262 CDYTMA – Pedestrian Clearance Delay Period Active

BAS:3

ENG 262 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the CDY pedestrian clearance delay period is running for that phase. The bit is cleared when this period is no longer running.

CODE **DESCRIPTION**

263 CRDTMA – Pedestrian Clearance Red Period Active

BAS:3
ENG 263 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the CRD pedestrian clearance red period is running for that phase. The bit is cleared when this period is no longer running.

264 PARTMA – Pedestrian All Red Timer Active

BAS:3 ENG 264 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the Pedestrian All Red timer is active for that phase. The bit is cleared when this timer is no longer running.

265 DOORSW1 – Door Switch Indication

(ANY) ENG 265 0:N

Zero indicates that the manual panel door or main cabinet door is open, or that no door switch mechanism is fitted. A non-zero value indicates that a switch is fitted and the doors are closed.

266 DFM_FLT_STATE – Detector Fault Monitoring Fault State

BAS:1 ENG 266 0:00XX00XX – inputs for I/O line 0
ENG 266 1:00XX00XX – inputs for I/O line 1
.....
ENG 266 247:00XX00XX – inputs for I/O line 247, where:

00000001 = DFM time-out fault has been reported
00000011 = The input has subsequently changed state
00010000 = Kerbside test fault has been confirmed
00110000 = The kerbside test has subsequently passed.

268 PRSFLS – Lamp Flashing States

BAS:3 ENG 268 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Reds
ENG 268 4:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Ambers
ENG 268 8:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Greens

A bit set to '1' indicates that the phase and colour has been requested to flash. Also see "ENG 194 PRSLMP".

CODE **DESCRIPTION**

269 ESP_MOVA_Forc – Bits to/from a Serial MOVA/DUSC unit

BAS:1 ENG 269 0:0000000X – 'TO' bit.
ENG 269 1:87654321 – Force Bits F1 to F8
ENG 269 2:65432109 – Force Bits F9 to F16
3:43210987 - Force Bits F17 to F24
4:21098765 - Force Bits F25 to F32
5:0000000X - CRB Bit
6:87654321 - Confirm Bits 61 to 68
7:65432109 - Confirm Bits 69 to 616
8:43210987 - Confirm Bits 617 to 624
9:21098765 - Confirm Bits 625 to 632

270 HIPRMD – Higher Priority Mode Active

BAS:1 ENG 270 0:76543210 – (Mode 0 – not used)
ENG 270 1:76543210 – Fixed Time Mode
ENG 270 2:76543210 – VA Mode
ENG 270 3:76543210 – CLF Mode
ENG 270 4:76543210 – Manual Mode
ENG 270 5:76543210 – Hurry Call Mode
ENG 270 6:76543210 – UTC Mode
ENG 270 7:76543210 – Part Time Mode
ENG 270 8:76543210 – Start up Mode
ENG 270 9:76543210 – FVP Mode
ENG 270 10:76543210 – Step On Mode
ENG 270 11:76543210 – Select Switch Mode
ENG 270 12:76543210 – Emergency Vehicle Mode
ENG 270 13:76543210 – Bus Priority Mode
ENG 270 14:76543210 – Pelican VA Mode
ENG 270 15:76543210 – (Mode 15 – not used)

A bit set to '1' indicates that the mode is disabled or a higher priority mode is running on that stream (0-7). Therefore a '0' usually implies that the mode can run or is running on that stream.

271 SSWACT – Select Switch Mode Active

BAS:1 ENG 271 0:76543210

A bit set to '1' indicates that the mode selected by the manual panel is actually running on the corresponding stream (0-7). Also see 'ENG 76 – SSWMDE' which indicates which mode has been selected.

272 PTXTMA – Pre-Timed Maximum Extra Period Active

BAS:3 ENG 272 0: FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the PTX time for the phase (see page 103) is currently running. Note that ENG 38 (MXAFAZ) will also show that the maximum green timer for the phase is active.

CODE **DESCRIPTION**

273 OMURUN – OMU Available Flag

BAS:1 ENG 273

This item is set TRUE when an OMU is connected. When an OMU is connected the code stores away information into the Shared RAM area.

275 ESPORT – ESP Debug Information (20 bytes)

BAS:2 ENG 275

Offset 0 : total number of bytes read
Offset 4 : no. of times ESP has been started
Offset 5 : no. of times first byte is not Start Of Message
Offset 6 : no. of times a too short or too long message has been received
Offset 7 : no. of times the message checksum has been wrong
Offset 8 : no. of times a message has stopped part way through
Offset 9 : no. of ... (internal errors)
Offset 10 : no. of messages with unknown type received
Offset 11 : no. of ping messages received
Offset 12 : no. of handset messages received
Offset 13 : no. of status requests received
Offset 14 : no. of faults requests received
Offset 15 : no. of MOVA messages received
Offset 16 : no. of UPDL message blocks received
Offset 17 : no. of UPDL message blocks rejected
Offset 18 : no. of messages with the same Message count
Offset 19 : no. of UPDL Telegram messages processed

280 DFMGRP_FAULTS – UTC 'DF' bit for each DFM group

BAS:1 ENG 280 0:76543210

1 byte. Bit 0 = DFM Group 0, to Bit 7 = DFM Group 7. A bit set to 1 = One or more detectors on that group have failed.

284 PBNLAT - Latched Push-Buttons

BAS:3 ENG 284 0:FEDCBAZY XWTUTSRQ PONMLKJI HGFEDCBA

Only for phases with kerbsides or ped demand delay. Push-button inputs active without kerbside active, which will result in a latched demand.

Also see:
ENG 254 – PBNACT ENG 256 – PBKLAT

CODE	DESCRIPTION

285 DFMLOG – DFM Faults (1 = Failed) (as FLD20-31 on PB800)

BAS:1 ENG 285 0 = Faults on I/O Port 0
ENG 285 1 = Faults on I/O Port 1
...

One byte per I/O port (0-30) and one bit per I/O line.
Bit set to '1' = Input failed DFM.

286 DFMDSF0 – DFM Faults (0= failed inactive)

BAS:1 ENG 286 0 = Faults on I/O Port 0
ENG 286 1 = Faults on I/O Port 1
...

One byte per I/O port (0-30) and one bit per I/O line.
Bit set to '0' = Input failed DFM stuck inactive.

287 DFMDSF1 – DFM Faults (1= failed active)

BAS:1 ENG 287 0 = Faults on I/O Port 0
ENG 287 1 = Faults on I/O Port 1
...

One byte per I/O port (0-30) and one bit per I/O line.
Bit set to '1' = Input failed DFM stuck active.

290 IO_cards_ok – Good I/O Cards

BAS:1 16-bit item; Bit set to 1 = card is responding, e.g.
Bit0 = serial I/O card#1.
Bit 14 = serial I/O card#15.

CODE	DESCRIPTION

291 SIOCPY – Raw Serial I/O

BAS:1 6 bytes per I/O card, starting with I/O card #1. For each card, 4 bytes = Input ports (0-3), 2 bytes = Output ports (0-1).

0 = Card #1, Input Port 0 (1 = Open Circuit)
1 = Card #1, Input Port 1
2 = Card #1, Input Port 2 (see below)
3 = Card #1, Input Port 3
4 = Card #1, Output Port 0
5 = Card #1, Output Port 1
6 = Card #2, Input Port 0
…through to…
89 = Card #15, Output Port 1

For the detector backplane type of Serial I/O card, Input Port 2 is connected to the Detector Card Master Fault outputs (if provided) as follows:

Bit 0: Master Fault Normally Open Detector Card #1
Bit 1: Master Fault Normally Open Detector Card #2
Bit 2: Master Fault Normally Open Detector Card #3
Bit 3: Master Fault Normally Open Detector Card #4
Bit 4: Master Fault Normally Closed Detector Card #1
Bit 5: Master Fault Normally Closed Detector Card #2
Bit 6: Master Fault Normally Closed Detector Card #3
Bit 7: Master Fault Normally Closed Detector Card #4

310 sclf_curr_state – Smooth CLF State

BAS:2 ENG 310 0:N

0 = Smooth CLF disabled
1 = No plan has been requested
2 = Plan has been requested where no plan is currently running, waiting for synchronisation point i.e. stage movement in lower priority mode
3 = Synchronising
4 = Synchronised
5 = Plan running
6 = Plan has been requested where a plan is currently running, waiting for synchronisation point
7 = Plan terminating
8 = Invalid, should never be observed

314 MOVA0ESLI

Indicates the end of saturation for a link (1-60) in MOVA Kernel 1. Same information as the Special Conditioning mnemonics MOVA0ESLIn.

CODE	DESCRIPTION

315 MOVA1ESLI

Indicates the end of saturation for a link (1-60) in MOVA Kernel 2. Same information as the Special Conditioning mnemonics MOVA1ESLIn.

316 MOVA2ESLI

Indicates the end of saturation for a link (1-60) in MOVA Kernel 3. Same information as the Special Conditioning mnemonics MOVA2ESLIn.

317 MOVA3ESLI

Indicates the end of saturation for a link (1-60) in MOVA Kernel 4. Same information as the Special Conditioning mnemonics MOVA3ESLIn.

318 MOVA0SATLA

Indicates the number of consecutive over-saturated cycles for a lane (1-30) in MOVA Kernel 1. Same information as the Special Conditioning mnemonics MOVA0SATLAn.

319 MOVA1SATLA

Indicates the number of consecutive over-saturated cycles for a lane (1-30) in MOVA Kernel 2. Same information as the Special Conditioning mnemonics MOVA1SATLAn.

320 MOVA2SATLA

Indicates the number of consecutive over-saturated cycles for a lane (1-30) in MOVA Kernel 3. Same information as the Special Conditioning mnemonics MOVA2SATLAn.

321 MOVA3SATLA

Indicates the number of consecutive over-saturated cycles for a lane (1-30) in MOVA Kernel 4. Same information as the Special Conditioning mnemonics MOVA3SATLAn.

CODE **DESCRIPTION**

322 MOVAkFn, MOVAkCONn, MOVAkDETn, MOVAkTO, MOVAkCRB

Indications for each (internal) MOVA Kernel.

```
BAS:3 and ENG 322 0  = MOVA0Fn = Force Bits for Kernel 1
BAS:3 and ENG 322 4  = MOVA1Fn = Force Bits for Kernel 2
BAS:3 and ENG 322 8  = MOVA2Fn = Force Bits for Kernel 3
BAS:3 and ENG 322 12 = MOVA3Fn = Force Bits for Kernel 4

BAS:3 and ENG 322 16 = MOVA0CONn = Confirm Bits for Kernel 1
BAS:3 and ENG 322 20 = MOVA1CONn = Confirm Bits for Kernel 2
BAS:3 and ENG 322 24 = MOVA2CONn = Confirm Bits for Kernel 3
BAS:3 and ENG 322 28 = MOVA3CONn = Confirm Bits for Kernel 4

BAS:3 and ENG 322 32 = MOVA0DETn = Detectors  1-32 for Kernel 1
BAS:3 and ENG 322 36 = MOVA0DETn = Detectors 33-64 for Kernel 1
BAS:3 and ENG 322 40 = MOVA1DETn = Detectors  1-32 for Kernel 2
BAS:3 and ENG 322 44 = MOVA1DETn = Detectors 33-64 for Kernel 2
BAS:3 and ENG 322 48 = MOVA2DETn = Detectors  1-32 for Kernel 3
BAS:3 and ENG 322 52 = MOVA2DETn = Detectors 33-64 for Kernel 3
BAS:3 and ENG 322 56 = MOVA3DETn = Detectors  1-32 for Kernel 4
BAS:3 and ENG 322 60 = MOVA3DETn = Detectors 33-64 for Kernel 4

BAS:1 and ENG 322 64 = MOVA0TO = TO Indication for Kernel 1
BAS:1 and ENG 322 65 = MOVA1TO = TO Indication for Kernel 2
BAS:1 and ENG 322 66 = MOVA2TO = TO Indication for Kernel 3
BAS:1 and ENG 322 67 = MOVA3TO = TO Indication for Kernel 4

BAS:1 and ENG 322 68 = MOVA0CRB = CRB Indication for Kernel 1
BAS:1 and ENG 322 69 = MOVA1CRB = CRB Indication for Kernel 2
BAS:1 and ENG 322 70 = MOVA2CRB = CRB Indication for Kernel 3
BAS:1 and ENG 322 71 = MOVA3CRB = CRB Indication for Kernel 4
```

325 LRTACTINF

```
BAS:2  ENG 325 0  = LRT Unit 0 Prepare influence function code
       ENG 325 1  = LRT Unit 0 Advance influence function code
       ENG 325 2  = LRT Unit 0 Stop-line influence function code
       ENG 325 9  = LRT Unit 1 Prepare influence function code
       ENG 325 10 = LRT Unit 1 Advance influence function code
       ...
```

This byte array holds the active Influence function code for each of the LRT Units. Same information as the Special Conditioning mnemonics LRT*ACTPRINF, LRT*ACTADINF and LRT*ACTSPINF. Nine bytes per unit, the first three giving the active PREPARE, ADVANCE and STOPLINE_PRESENCE influence function codes.

CODE	DESCRIPTION

326 LRTCTL

BAS:2 ENG 326 0 = LRTCTL0 = LRT Unit number in control on stream 0
ENG 326 1 = LRTCTL1 = LRT Unit number in control on stream 1
...

Each byte holds the Unit Id of the LRT Unit nominally in control of the intersection of the stream, or 255.

327 LRTSTATE

BAS:2 ENG 327 0 = LRT Unit 0 Prepare state
ENG 327 1 = LRT Unit 0 Advance state
ENG 327 2 = LRT Unit 0 Stop-line state
ENG 327 3 = LRT Unit 1 Prepare state
ENG 327 4 = LRT Unit 1 Advance state
...

This byte array holds the LRT unit state for the PREPARE, ADVANCE and STOPLINE sequence of influences. Same information as the Special Conditioning mnemonics LRT*PRSTATE, LRT*ADSTATE and LRT*SPSTATE. Three bytes per unit.

328 LRTUNITINH

(ANY) ENG 328 0 = LRT Unit 0 inhibited by First Come First Served logic
ENG 328 1 = LRT Unit 0 inhibited by an Overlap Inhibit
ENG 328 2 = LRT Unit 0 inhibited by its Follow Inhibit
ENG 328 3 = LRT Unit 1 inhibited by First Come First Served logic
ENG 328 4 = LRT Unit 1 inhibited by an Overlap Inhibit
...

This byte array indicates which inhibits are active for each LRT Unit. Three bytes per unit.
Byte 0 non-zero value indicates LRT Unit inhibited by First Come First Served logic
Byte 1 non-zero value indicates LRT Unit inhibited by the Overlap Inhibit period of another LRT unit
Byte 2 non-zero value indicates LRT Unit inhibited by the Follow Inhibit period of the previous tram on this LRT Unit

331 LRT*REQ

BAS:1 ENG 331 0:XXXXXXXX

Indicates if an LRT Unit has an active LRT Request Influence, 1 bit per LRT Unit.
ENG 331 0 displays the status of LRT units 0-7
Each bit indicates:
0 = no LRT Request active
1 = LRT Request is active

CODE **DESCRIPTION**

333 LRTSUSEVT – Suspect LRT Events

BAS:3 ENG 333 0 = LRT*PREVTSUS = Prepare Events
ENG 333 4 = LRT*ADEVTSUS = Advance Events
ENG 333 8 = LRT*SPEVTSUS = Stopline Presence Events
ENG 333 12 = LRT*SCEVTSUS = Stopline Cleared Events
ENG 333 16 = LRT*CLEVTSUS = Cancel Events

One bit per LRT Unit, with Bit 0 = LRT Unit 0. 1 = Suspect Event.

334 LRTFLTEVT – Faulty LRT Events

BAS:3 ENG 334 0 = LRT*PREVTFLT = Prepare Events
ENG 334 4 = LRT*ADEVTFLT = Advance Events
ENG 334 8 = LRT*SPEVTFLT = Stopline Presence Events
ENG 334 12 = LRT*SCEVTFLT = Stopline Cleared Events
ENG 334 16 = LRT*CLEVTFLT = Cancel Events

One bit per LRT Unit, with Bit 0 = LRT Unit 0. 1 = Faulty Event.

335 LRTACTEVT – Active LRT Events

BAS:3 ENG 335 0 = LRT*PREVTACT = Prepare Events
ENG 335 4 = LRT*ADEVTACT = Advance Events
ENG 335 8 = LRT*SPEVTACT = Stopline Presence Events
ENG 335 12 = LRT*SCEVTACT = Stopline Cleared Events
ENG 335 16 = LRT*CLEVTACT = Cancel Events

One bit per LRT Unit, with Bit 0 = LRT Unit 0. 1 = Active Event.

339 LLF_phases

BAS:3 ENG 339 0 = LLF?RED = Fault actions triggered for Phase Reds
ENG 339 4 = LLF?AMB = Fault actions triggered for Phase Ambers
ENG 339 8 = LLF?GRN = Fault actions triggered for Phase Greens

Phases on which Last Lamp Faults have been confirmed and actions triggered, e.g. signals off or flashing.

One bit per phase, with Bit 0 = Phase A. 1 = Fault detected and actions triggered.

13.5 Phase Sequence Steps

The diagram on the following page describes the various states a phase goes through before appearing at right of way and then returning to no right of way. It shows the interaction between several ENG items described in the previous section.

It does not include any information on how the controller determines the ‘next stage’ which actually controls which phases are to gain or lose right of way. The ‘next stage’ algorithm used by the firmware is described in the General Handbook.

This information should only be used as a guide as each version of the controller firmware may operate slightly differently.

The diagram starts at the top with a phase at no right of way. When a stage change is initiated, this phase may gain right of way if it resides in the destination (the ‘next’) stage. Regardless of whether the phase will actually appear, it starts ‘moving’ through the various states on its way to right of way. The major steps in the sequence are highlighted.

When the phase ‘moves’ from one step to the next, the appropriate bit for the phase is removed from one item and set in the next. For example, when the phase starts to gain right of way, the phase moves from ATNORW to GAINRW, i.e. the bit for the phase is removed from ATNORW and is set in GAINRW.

Once the phase has started this process and is either fixed in the stage or demanded the firmware will ensure that the phase keeps right of way (ENG 17 - FZKEEP). The controller may be allowed to make another stage change while this phase is still gaining right of way, but this phase must also reside in any new destination stage that is chosen.

Eventually the phase will start moving to right of way and then appear at green, or the controller will move to a stage which does not include the phase, if there is no demand for the phase or the phase is inhibited for example.

If the phase has been given right of way and then the controller moves to a stage that does not include the phase, the phase will lose right of way and eventually end up back at no right of way.

	State and Conditions for Movement	R.O.W.* STATE
1	**ATNORW (ENG 10)**	at no R.O.W.
	When the next stage includes this phase, go to 2.	
2	GAINRW (ENG 12)†	at no R.O.W.
	When the phase delay (if any) expires, go to 3.	
3	GAIRWD (ENG 14)†	at no R.O.W.
	Actioned immediately (go immediately to 4)	
4	**'Request Green' set in FAZCMD (ENG 1)**	at no R.O.W.
	When the intergreens expire, go to 5.	
5	INTERGREENS_EXPIRED (ENG 244)†	at no R.O.W.
	When the configured RLM delay expires, go to 6. If no delay and in PHASE_ENABLES, go to step 7.	
6	RLM_DELAYS_EXPIRED (ENG 246)†	at no R.O.W.
	If in PHASE_ENABLES (ENG 243), go to 7	
7	'Go Green' set in FAZCMD (ENG 1)†	at no R.O.W.
	Actioned immediately (go immediately to 8)	
8	**TORW (ENG 154)†**	Gaining R.O.W.
	When the lamp sequence finishes, go to 9	
9	**ROWFAZ (ENG 33)**	at R.O.W.
	When the phase is not in the next stage, go to 10	
10	LOSERW (ENG 13)†	at R.O.W.
	When the phase delay (if any) expires, go to 11	
11	LOSRWD (ENG 251)†	at R.O.W.
	When the phase leaving type condition is met, go to 12	
12	'Go Red' set in FAZCMD (ENG 1)†	at R.O.W.
	Actioned immediately (go immediately to 13)	
13	**TONORW (ENG 124)**	Leaving R.O.W.
	When the lamp sequence finishes, go back to the top.	

† Short activations may not appear on the handset

* Abbreviation for 'Right Of Way'

Note: The Index for this document is located in section 12 (starting on page 159), which is before the optional Appendix on the Engineering commands.

LAST PAGE OF THE HANDSET HANDBOOK