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SYSTEM/PROJECT/PRODUCT: ST800P & ST800SE

GUIDANCE NOTES FOR THE NEW SMALL SIEMENS TYPE 800 TRAFFIC CONTROLLERS

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Contents

1. Introduction

The following pages summarise how to use the new smaller ST800 traffic controllers from Siemens, the ST800P stand-alone pedestrian controller for the UK approved to TR0141C and the ST800SE small export controller.

This document should be read in conjunction with the full ST800 handbooks 667/HE/27000/000 and 667/HH/27000/000 as it assumes knowledge of the ST800 and only concentrates on the differences between the original ST800 and these new controllers. The main differences are:

- Smaller size: 4 or 8 phases in an 11” rack rather than 32 phases in a 19” rack.
- The new firmware and EPLD’s are required.
- The connections on the back of the new four phase lamp switch cards.
- The ST800P configuration is loaded through the handset port (no PROM).
- The lamp monitoring arrangements for a stand-alone pedestrian crossing.
- The handset commands to configure the stand-alone pedestrian crossing.

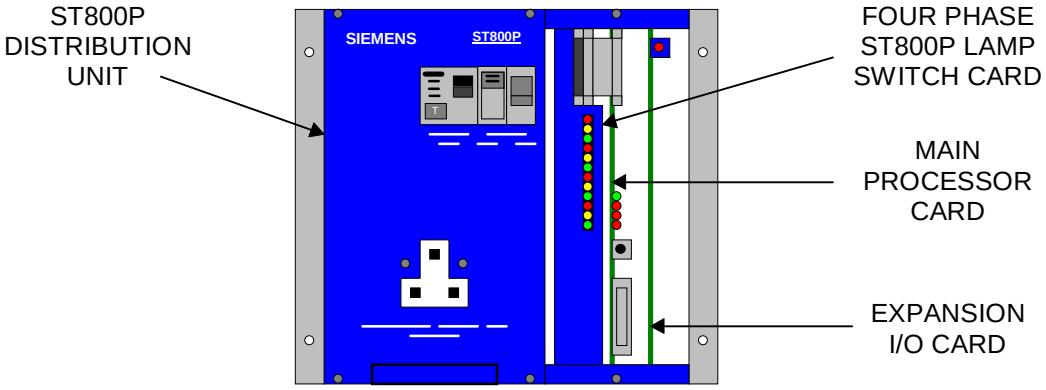
Parts of this document also apply to stand-alone pedestrian streams provided by ST800 intersection controllers and to Puffin and Toucan phases at intersections configured using IC4 (issue 3 or later), see section 9 “Configuring The ST800P”.

Following these pages is a blank Fault Information form. If there any problems that require the assistance of technical support from either the depots or from Poole, a completed copy of this sheet for the controller will assist in trying to diagnose the problem.

2. The New ST800P and ST800SE

These controllers are smaller four or eight phase versions of the larger 32 phase ST800.

The ST800P is intended for use as a stand-alone pedestrian crossing traffic controller, i.e. at a stand-alone Pelican, Puffin or Toucan crossing to meet TR0141C.



The ST800SE is a small export controller. It uses the same 11” rack as the ST800P but uses a different power distribution unit and its lamp switch cards do not include any lamp monitoring.

3. Installation and Commissioning Steps

The ST800P and ST800SE controllers are installed in the same way as a standard ST800 controller and therefore the procedure described in the ST800 installation, commissioning and maintenance handbook 667/HE/27000/000 should be followed once the following sections in this document have been read and understood.

a) the firmware has been up-issued and new EPLD’s are required for the ST800P and ST800SE, see section 4.

b) the self-test has been modified for this latest issue of firmware, see section 5.

c) the connections to the back of the four phase ST800P lamp switch card differ from those on a standard eight phase lamp switch card, see section 6.

d) the ST800P will normally have its configuration loaded serial through the handset port so no configuration PROM will be fitted, see section 7.

e) the red lamp monitoring set-up of the ST800P has two built in red channels for each vehicle phase, see section 8.

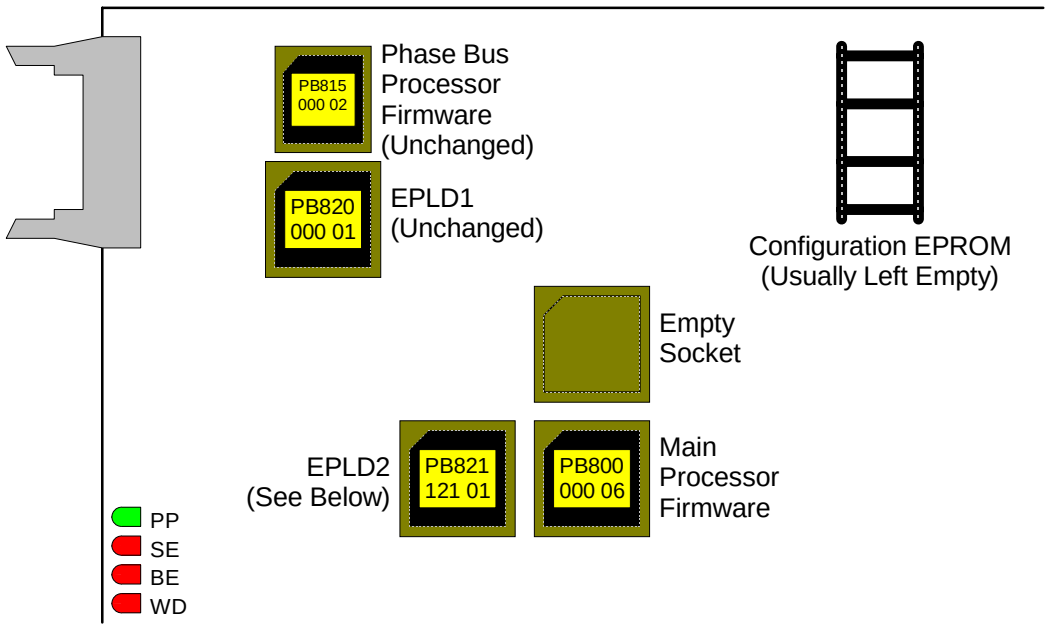
As with the T400 Pelican, the ST800P stand-alone pedestrian controller will need to be customised on the street using the handset before the signals are switched on, see section 9. The special instructions on the configuration print-out will detail what the default configuration provides and what may requiring changing.

Also note that some new fault log entries have been added and some existing entries modified for this new issue of firmware. Any new or modified fault log entries are listed in section 10.

4. New PROM's and EPLD's

Before switching the controller on for the first time, check that the correct firmware PROM and the correct EPLD's are fitted to the main processor card.

The socket for the configuration PROM should be left empty as the configuration data will normally be loaded through the handset port from a PC (see section 7).



4.1 Firmware PROM's

The main processor firmware must be PB800 issue 6 or later ('`PB800 000 06`' on the label and '`PIC:PB800 ISS 6`' on the handset) in order to function with four phase lamp switch cards and to provide the new stand-alone pedestrian facilities.

The Phase Bus Processor firmware has not been modified and so should still be PB815 issue 2 ('`PB815 000 02`' on the label and '`SIC:PB800 ISS 2`' on the handset).

4.2 EPLD's

Until now, most ST800 CPU cards have been fitted with the original /000 variants of the PB820 and PB821 EPLD's. However, a number of variants of the PB821 EPLD2 have been produced to limit the facilities that an ST800 is allowed to run.

The handset command 'PLD' will display the variant of EPLD2 currently fitted and a short description. Self-test will also display this information on the handset.

Part Number	Handset Display	Facilities Enabled
667/1/12821**/000**	PLD:000 LMU	Lamp monitoring but not integral SDE
667/1/12821**/101**	PLD:101 BASIC	Neither lamp monitoring or integral SDE
667/1/12821**/102**	PLD:102 LMU+SDE	Lamp monitoring and integral SDE
667/1/12821**/121**	PLD:121 SINGLE PED	Single stand-alone ped. stream only
667/1/12821**/122**	PLD:122 PED ONLY	Multiple stand-alone ped. streams only.

For example, the original ST800 EPLD2 was variant /000 which enabled lamp monitoring, hence the display '`PLD:000 LMU`', whereas the PLD variant /102 also enables integral SDE, hence the display '`PLD:102 LMU+SDE`'.

ST800P stand-alone pedestrian traffic controller's will by default be shipped with EPLD2 variant /121 which only allows the controller to be used as a single pedestrian crossing. Even if the configuration contains two streams, which the default configurations do, the controller will automatically disable the second stream and run just a single pedestrian crossing if EPLD2 variant /121 is fitted. To run two or more* pedestrian streams, the /121 variant EPLD2 must be replaced with a /122 variant EPLD2.

Both the EPLD2 variants /121 and /122 allow integral SDE/SA (which is described in more detail on page 28). Therefore, if the original /000 variant is still fitted which does not permit the use of integral SDE/SA but which is enabled by default in the stand-alone configuration's then the controller will report a compatibility fault and not illuminate the signals.

Similarly, if EPLD2 variants /121 or /122 are fitted to a controller which has one or more intersection streams configured, then a compatibility fault will be logged as these variants do not allow any intersection streams.

* More than two pedestrian streams would exceed the capabilities of the ST800P platform, however up to eight pedestrian streams can be configured on IC4 and provided by the original ST800 controller.

5. Controller Self-Test

The controller self-test should be used as on the ST800 to check the integrity of the controller even if it the controller has not yet been configured. However the self-test has been modified for PB800 issue 6 in order to:

a) determine the fail to black-out or fail to flashing set-up of the controller, and
b) detect and check four phase lamp switch cards.

5.1 New Lamp Supply Arrangement Checks

The self-test of the new firmware PB800 issue 6 now checks the lamp supply arrangement of the controller after checking each lamp supply relay and each triac and monitor circuit.

With the SSR and relay A switched on but with relay B switched off, it pulses a selection of triacs to check that the lamp supply to all the triacs on all of the cards has been removed:

```
Checking Lamp
Supply Arrangement:
RelayB:All Sigs Off
```

If any voltage monitors detect lamp supply during this test then the self-test shut-down and displays the fault on the handset, e.g. if Phase A Red detects voltage:

```
Relay B Off But...
R-00000000+00000001
A-00000000+00000000
G-00000000+00000000
```

It then switches relay B back on and switches off relay A instead and again pulses a selection of triacs and checks which, if any, still have lamp supply.

From this, the controller can determine whether the wiring on the back of the rack is set-up for ‘fail to black-out’ only, i.e. for UK use, or whether it is wired for ‘fail to flashing’, i.e. for export.

If the rack is set-up for ‘fail to black-out’ then relay A will also switch off the lamp supply to all the triacs on all of the cards, i.e. only the ‘green supply’ from the power distribution unit (which can be switched off by any of the lamp supply relays) is passed to the lamp switch cards. If this is the case, then this result will be displayed on the handset and the self-test continues as before:

```
RelayB:All Sigs Off
RelayA:All Sigs Off
Controller Set-Up:
'Fail To Black-Out'
```

However, if the rack is set-up for ‘fail to flashing’ then the red/amber lamp supply on the back of the power distribution unit which is not switched off by relay A is used to power the red and amber triacs on the lamp switch cards. However, the green lamp supply is still switched off:

```
Checking Lamp
Supply Arrangement:
RelayB:All Sigs Off
RelayA:Ok, Grns Off
```

The ‘fail to flashing’ lamp switch cards also differ from the ‘fail to black-out’ lamp switch cards. Both have two lamp supply input connections, each one separately fused on the card, but which triacs each supplies is modified by links:

- On a ‘fail to black-out’ lamp switch card, one input supplies the first four phases while the other independently supplies the last four phases.
- On a ‘fail to flashing’ lamp switch card, one input supplies the red and amber triacs while the other independently supplies the green triacs.

On the handset, self-test will show the state of the rack, the state of the four lamp switch cards and the state of the link on the CPU card. If a lamp switch card is not fitted then ‘__’ is displayed. Normally the link on the CPU card will be set to the ‘fail to blackout’ position, so the controller still extinguishes all the signals until the facility is actually required:

```
Rack L/S Cards CPU
 FL __+__+__+FL BO
FailFlash Available
But Not Selected.
```

If one or more ‘fail to black-out’ lamp switch cards are fitted in a ‘fail to flashing’ rack then the following error message will be displayed and the self-test will shut-down:

```
'Fail To Black-Out'
Lamp Switch Cards
Fitted In A 'Fail
To Flashing' Rack.
```

Regardless of whether the link on the CPU card is set to ‘fail to black-out’ or ‘fail to flashing’, if the rack and lamp switch cards allow the ‘fail to flashing’ option then the controller will flash the red and amber LED’s on all of the lamp switch cards for five seconds.

5.2 Four Phase Lamp Switch Cards

The new controller self-test will also automatically detect whether each lamp switch card is equipped with either four or eight phases.

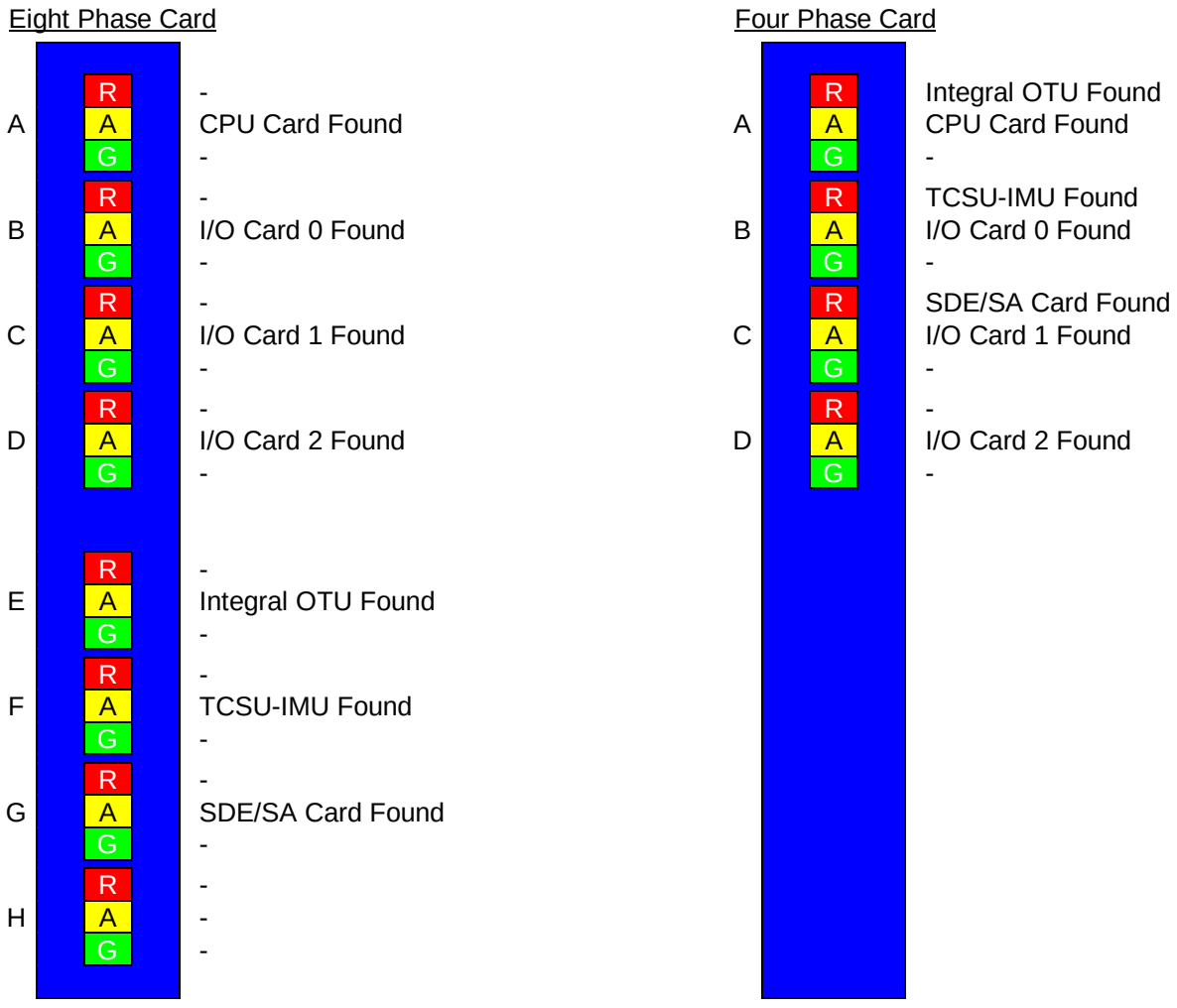
When displaying each amber LED on each card in sequence, it will only illuminate the four amber LED’s on a four phase lamp switch card.

If an eight phase card appears as a four phase card to the self-test, then the bottom four LED's on the card will not illuminate. This must be checked visually by the operator, so as before, it is vitally important that all the amber LED's on all the lamp switch cards are seen to illuminate in sequence before the button is pressed again to continue the self-test.

If a four phase card appears as an eight phase card to the self-test, then this fault will be recognised when the self-test attempts to pulse the triacs and check the monitors on the bottom four phases.

Note that the controller can currently 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. The self-test will shut-down (as will normal operation - see FLF 44) if a bad combination of lamp switch cards is detected.

At the end of the self-test, the controller illuminates a number of amber LED's on the first phase card to show which cards on the extended system bus have been detected by the controller. However, if a four phase card is fitted in the first position, then the information which used to appear on the bottom four amber LED's will be displayed on the top four red LED's instead, as shown below:



6. Connections

The following diagrams detail the connections on the back of the power distribution unit and the back of a four phase ST800P lamp switch card. For the connections on the back of the four phase ST800SE cards, refer to the normal eight phase card diagrams in the ST800 handbooks, ignoring the outputs for phases 5 to 8.

ST800P Lamp Switch

PLB	z	b	d	
32	EARTH			
			NEUTRAL	30
28	5-8 or GRN SUPPLY			
			1-4 or R/A SUPPLY	26
24	ZXO-N (240V)			
			ZXO-N (110V)	22
20	ZXO-LIVE			
16	Sen34+	COMMON	LSupp-	16
14	Sen35+	Sen33+	LSupp+	14
12	Sen36+			12
10			SOLAR	10
8	V1 R_0		V1 Grn	8
6	-		-	6
4	P1 RM		V1 Amb	4
2	-		P1 WT	2

PLA	z	b	d	
32	V2 Amb		V2 R_0	32
30	-		P1 GM	30
28	-		V2 Grn	28
26	-		P2 WT	26
24	P2 RM		-	24
22	-		-	22
20	-		P2 GM	20
18	-		V1 R_1	18
16	-		-	16
14	-		-	14
12	V1 R_2		-	12
10	-		-	10
8	-		-	8
6	-		V2 R_1	6
4	-		-	4
2	-		V2 R_2	2

Power Distribution Unit

PL1	z	b	d	
32	EARTH IN			
			LIVE INPUT	30
28	LIVE INPUT			
			NEUTRAL INPUT	26
24	NEUTRAL INPUT			
			REG. SIGN.	22
20	SOLAR SUPPLY			
16	SPARE	N/C	SPARE	16
14	ZXO-N	N/C	ZXO-L	14
12	0v	0v	0v	12
10	0v	CPU 5v	CPU 5v	10
8	12v	DET 24v	SSR	8
6	P/FAIL	ESB 5v	ESB 5v	6
4	REL-B	REL-DIM	CPU 24v	4
2	REL-A	LSupp+	LSupp-	2

PL2	z	b	d	
32	DIM COMMON			
			NEUTRAL RETURNS	30
28	NEUTRAL RETURNS			
			NEUTRAL RETURNS	26
24	NEUTRAL RETURNS			
			NEUTRAL RETURNS	22
20	NEUTRAL RETURNS			
			DIM-LIVE (240V)	18
16	DIM-LIVE (240V)			
			DIM-LIVE (160V)	14
12	R/A only SUPPLY			
			R/A only SUPPLY	10
8	ALL or GRN SUPPLY			
			ALL or GRN SUPPLY	6
4	50-0-50V SUPPLY			

Stream 1	Stream 2	Wire Colour	Connection	Monitoring On Card
V1 R_0	V2 R_0	Orange	Vehicle Red	None
V1 R_1	V2 R_1	Red	Vehicle Red	1st RLM Channel
V1 R_2	V2 R_2	Pink	Vehicle Red	2nd RLM Channel
V1 Amb	V2 Amb	Slate	Vehicle Amber	None
V1 Grn	V2 Grn	Green	Vehicle Green	None
P1 RM	P2 RM	Red	Ped. Red Man	None
P1 WT	P2 WT	Yellow	Ped. Wait Indicator	None
P1 GM	P2 GM	Green	Ped. Green Man	None

7. Loading Configuration Data

7.1 ST800P Configurations

The ST800P stand-alone pedestrian controller will normally run one of the default configuration generated by Siemens Poole which are listed below. However these may be customised by the field service depot or by the customer using IC4 to meet the particular requirements of an area or of a particular site:

EM60105 - Stand-Alone Pelican,
MCE0125 style flashing green man / flashing vehicle amber.

EM60106 - Stand-Alone Crossing with Near-Side Pedestrian Signals,
TR0141C near-sided Puffin or Toucan crossing.

EM60107 - Stand-Alone Crossing with Far-Side Pedestrian Signals,
TR0141C far-sided Pedestrian, Puffin or Toucan crossing.

These default configurations can be customised on the street using the handset in a similar way to the T400 Pelican. The commands to customise an ST800P are described later starting on page 20 and allow facilities such as kerbside and on-crossing detectors and speed discrimination or assessment to be enabled or disabled on the street using the handset. However, the fundamental lamp sequence (Pelican, near-sided signals or far-sided signals) cannot be changed on the street and is fixed in each of the three default configurations.

7.2 Loading an ST800P Configuration

Normally the configuration data for an ST800P stand-alone pedestrian crossing controller will be loaded from a PC running IC4 in to the controller through the controller's handset port so a configuration PROM will not normally be fitted.

Rather than loading the configuration data in to an ST800P after it has been installed using a PC on the street, the configuration data could be loaded while the controller is still in the depot and, provided the battery insulator is removed, this configuration data will still be present in the battery backed-up RAM when the controller is installed.

The procedure for loading the configuration data is given overleaf. Alternatively, a configuration PROM of the required default stand-alone pedestrian configuration can be plugged in and the controller initialised in the usually way.

In addition, once the controller has been initialised, the controller can be switched off, the configuration PROM removed, and when the controller is switched back on, no fault will be logged and the controller will continue to operate normally. Therefore, only one copy of each configuration need be carried and can be used to initialise several ST800P controllers. Note: only these default stand-alone pedestrian configurations allow this option as the controller will log a memory fault if

a ‘normal’ configuration PROM, e.g. an intersection configuration PROM is removed after the controller has been initialised.

7.3 Procedure for Serial Configuration Loading

The following procedure should be used to send a new configuration from a PC to the controller. Note that IC4 will refuse to send a configuration to the controller if the controller is already running the same EM number and issue.

Step	Actions to be Taken
1)	Connect the 9-way end of the serial cable 667/1/17523/003* to a PC serial communications port, e.g. COM1 or COM2. Connect the 25-way end to the controller’s handset port. * Same cable as used by IPT1
2)	If IC4 is not already running, start the application in the usual way, e.g. from the Windows Start Menu. Note that the dongle is not required for config load.
3)	From the IC4 menu, choose ‘Options’ and select Controller Communications.
4)	Set the ‘Port Number’ to match the communications port where the serial cable was connected and select ‘Ok’. The other options on this screen should not need changing from their default values.
5)	Now select the ‘Send Configuration’ line from the ‘Controller’ option on the menu. This will take you through the following steps to send a configuration to the controller.
6)	IC4 will now display a dialog box where the required configuration data file can be selected, see the list of default configurations on page 13.
7)	IC4 will now attempt to establish communications with the controller. If this fails, try the following: • Check that the correct port number is specified in the options. • Disconnecting the cable from the controller for at least 5 seconds and then re-connect it and try again. • Try communicating with the controller using a normal hand-held handset. • Try communicating with the controller using another application on the same PC, e.g. Siemens IPT.
8)	If communications could be established, then IC4 will display a dialogue showing the EM number of the configuration about to be downloaded. Choose the ‘Load’ option to continue.

Step	Actions to be Taken
9)	In order to perform the configuration load, the controller needs to be given the level 2 access command (PME) and the level 3 initialisation commands (TKE, LRN, CNN) otherwise the controller will not accept the new configuration. IC4 opens a dialogue window into which these commands can be entered. Check that the commands are accepted by the controller in the response part of the window. Note that the level 3 access button on the front of the controller's CPU card will need to be pressed before the level 3 commands are entered, and that the initialisation commands will be rejected with a '*L' error while the signals on/off switch on the manual panel is in the 'on' position.
10)	IC4 will then send the configuration to the controller (which shouldn't take more than a minute or so).
11)	Once loading is complete and the controller told to use the new configuration, another dialogue will appear asking for the level 2 access command (PME) to be entered and then the level 3 button to be pressed again. Once IC4 has told the controller to use this new configuration data, the controller should be switched off and back on. If a configuration PROM was fitted to the controller, it should be removed while the power is switched off. If one of the default stand-alone pedestrian configurations (see page 13) was loaded, then the controller will need 'customising' using the handset before the signals are switched on, as described in the special instructions pages of the print-out of the configuration.

7.4 Configuration Commands

The following commands show the identity, issue state and sumcheck of the configuration data which was loaded into the controller, whether that configuration data was loaded from a configuration PROM or loaded through the handset port.

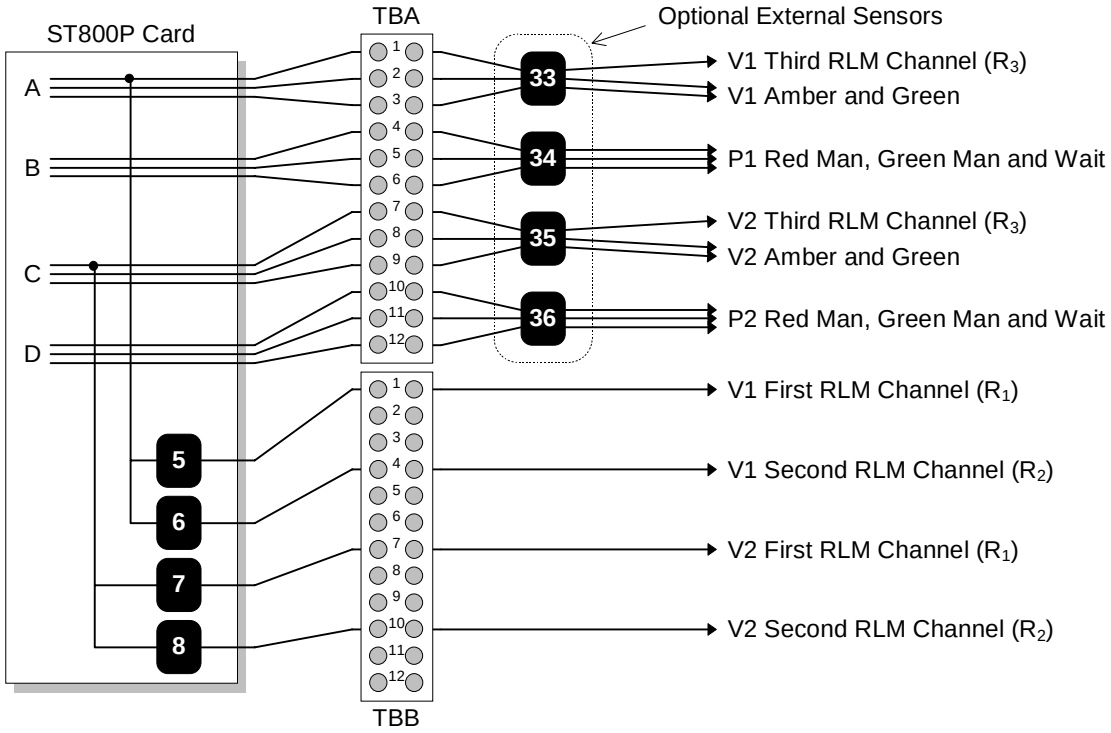
	DESCRIPTION AND REMARKS	
CIC	CIC : <Text> **C**onfiguration **I**dentity **C**ode number. Normal response is 'EM' followed by the 5-digit manufacture number then the issue number. Note that this command shows the identity of the configuration loaded into RAM and thus does not show the identity of a new configuration PROM until it has been loaded using the initialisation commands.	R

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, whether the configuration was loaded from a configuration PROM or loaded through the handset port. As with CIC, this command shows the checksum of the configuration which was loaded into RAM and thus does not show the checksum of a new PROM until it has been loaded using the initialisation commands. Use the command 'CRC' rather than ENC 4 to ENC 7 to view the checksum of the loaded configuration as ENC will always attempt to read the contents of a configuration PROM, even if one is not fitted.	R

8. Lamp Monitoring

8.1 Default Red Lamp Monitor Arrangement

Unlike the ST800 which has one lamp monitor sensor per phase, the ST800P can have a number lamp monitor sensors configured to monitor the same vehicle phase so that the individual vehicle approaches of the stand-alone crossing can be separately red lamp monitored. The default configurations and the ST800P lamp switch card provide lamp monitoring as follows:



Therefore, the ST800P lamp switch card by default provides two RLM channels (R_1 and R_2) for each vehicle phase A (V1) and C (V2) using lamp monitor sensors 5 through 8.

The external sensors 33 through 36 can be fitted to provide lamp monitoring on each of the four phases A to D if required and by default, sensors 33 and 35 will perform red lamp monitoring and thus provide a third RLM channel (R_3) on each phase.

Since all of the sensors monitoring a vehicle phase on a stand-alone stream will by default perform red lamp monitoring, there will be three RLM channels on each stream ‘RLM 0:3’ and ‘RLM 1:3’. If less channels are required then the number of channels can be reduced using ‘RLM’ handset command described overleaf…

8.2 Changing the Red Lamp Monitor Arrangement

	DESCRIPTION AND REMARKS	
RLM	RLM <Stream 0 to 7> : <Number Of RLM Channels> Defines the number of **R**ed **L**amp **M**onitored channels on each of the stand-alone streams, i.e. the number of lamp monitor sensors which perform red lamp monitoring on the vehicle phase of that stream.	3

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 then 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 are reduced, the sensors which 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'.

Therefore, if 'RLM 0=2' is entered with the default set-up as shown on the previous page, sensor 33 would stop performing red lamp monitoring. If the sensor is still fitted, it will still perform full colour lamp monitoring of the vehicle phase. If the sensor is not fitted, then 'RLM 0=2' must be entered.

If only one monitored approach is required, then enter 'RLM 0=1' and sensor 6 would also stop performing red lamp monitoring. This just leaves sensor 5 to perform red lamp monitoring on red output R_1.

If 'RLM 1=0↵' is entered on a dual controller to set the number of RLM channels on the second stream to zero, then the second stream is extinguished, but no fault is raised. This allows a dual configuration to be converted in to a single. Note that if a 'single stand-alone stream' PLD is fitted, the controller will automatically set RLM 1:0 and will reject with a '*C' error any attempt to increase the number of RLM channels on that stream.

Only the last stream still enabled can be disabled, i.e. to convert a dual into a single, stream 1 must be disabled, not stream 0. Similarly, to convert a triple* into a dual, stream 2 must be disabled, leaving streams 0 and 1 enabled, and to then convert it into a single, stream 1 can be disabled leaving just stream 0. Note however that any attempt to disable a stand-alone stream will be rejected if any intersection streams have been configured.

* More than two pedestrian streams would exceed the capabilities of the ST800P platform, however up to eight pedestrian streams can be configured on IC4 and provided by the original ST800 controller.

8.3 Clearing RLM Faults Which Extinguish The Signals

When the controller detects two red lamp failures on any sensor configured to perform red lamp monitoring, it will log a RLM fault against the vehicle phase and extinguish the vehicle and pedestrian signals for that stream.

As with the ST800, the KLD handset command will identify the sensor and missing load in watts. The red lamps monitored by that sensor should be replaced and the handset command KRD=1 entered. This will temporarily clear the second red lamp fault and allow the stream to restart. If the red lamps are still missing, then the stream will switch off again as soon as the fault is re-detected.

Note that the power does not need to be switched off and back on so the other stream of a dual crossing is not affected.

With issue 6 firmware or later, holding down the level 3 access button on the front of the CPU card for 10 seconds will also clear the red lamp faults and attempt to restart any extinguished stream(s), effectively performing a KRD=1.

However, if the controller has been configured as ‘RLF2 Only Cleared By RFL=1’, then the above facility is effectively disabled since KRD=1 on its own will not clear the red lamp monitor faults and thus will not restart the stream.

Note that this facility is available on both ST800’s and ST800P’s.

8.4 No Load When Initially Learning

If the controller detects no load on any sensor configured to perform red lamp monitoring while attempting to initially learn the site, it will also log a second red lamp fault against the vehicle phase.

However, the lamp monitor will need to be reset and learning restarted by entering ‘KLR=1’ to clear this fault.

9. Configuring The ST800P

As with the T400 Pelican, the signals of the ST800P 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 and the following sections.

9.1 I/O Allocation

A fully equipped ST800 controller can use up to 12 I/O ports. Each I/O port normally contains 8 input lines (e.g. for detectors and push-buttons) or 8 output lines (e.g. for UTC reply bits). This gives at total of 96 I/O lines numbered 0 to 95.

Port	Lines	Type	Card	Connector
0	0-7	Input	CPU	X3 (inner)
1	8-15	Input	CPU	X3 (inner)
2	16-23	Input	I/O 0	PLB
3	24-31	Input	I/O 0	PLC
4	32-39	Output	I/O 0	PLD
5	40-47	Output	I/O 0	PLE
6	48-55	Input	I/O 1	PLB
7	56-63	Input	I/O 1	PLC
8	64-71	Output	I/O 1	PLD
9	72-79	Output	I/O 1	PLE
10	80-87	Input	I/O 2	PLB
11	88-95	Input	I/O 2	PLC

Alternatives (Set up by IC4)

	Type	Card	Connector
⇔	Input	SDE/SA	PLB
⇔	Input	SDE/SA	PLB
⇔	Input	SDE/SA	PLC
⇔	Input	SDE/SA	PLC
⇔	Output	CPU	X3 (outer)

The I/O will be allocated via the configurator, as normal for the ST800 controller, however these allocations will be to the 96 'logical' I/O lines. The configurator may initially de-allocate several less frequently used inputs and outputs so if these lines 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, push-buttons, kerbside or on-crossing detectors is not required, e.g. a kerbside detector on input 12, then that input may be de-allocated by setting 'IOA 12=255'. This frees-up input 12 so it may be used by another input, 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 this example, the commands to re-arrange the I/O and review the changes 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-arranging the I/O, always use the IOR command 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 and IOR access the physical I/O lines.

	DESCRIPTION AND REMARKS	
IOP	IOP <I/O Physical Port Number 0 to 11> : <Binary> **I/O P**hysical port state as the detector inputs enter the controller before any processing (except U/D) is performed, or as the outputs leave the controller.	R
IOL	IOL <I/O Logical Port Number 0 to 11> : <Binary> **I/O L**ogical Port display. Displays the state of the 8 lines on each logical I/O port. This is the same as the I/O physical port display (IOP), except where the logical to physical mapping has been changed using IOA. It also shows the state of the input after any inversion or forcing of the detector has been applied.	R
IOA	IOA <Logical I/O Line 0 to 95> <Function> : <Physical I/O Line 0 to 95> **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 (0-95) or to disable it, where 254 forces the logical input active and 255 forces the logical input inactive. Use IOR command to review any changes.	3
IOR	IOR <Physical I/O Line 0 to 95> : <Logical I/O Line 0 to 95> <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
DET	DET <Logical I/O Line 0 to 95> <Function> : <Force Request 0 to 2> 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.	2
IPS	IPS <Logical I/O Line 0 to 95> <Function> : <Input Inverted? (0 or 1)> **I**n**P**ut **S**ense indicates that the specified I/O line should be inverted by the controller before it is processed.	2
IOB	IOB <Board Number 0 to 2> : <Fitted? 0 (No) or 1 (Yes)> Indicates which **I/O B**oards should be fitted and is used on power-up by the controller to ensure that at the minimum number of I/O boards are fitted, also see FLF 13.	2

9.2 Vehicle Timings

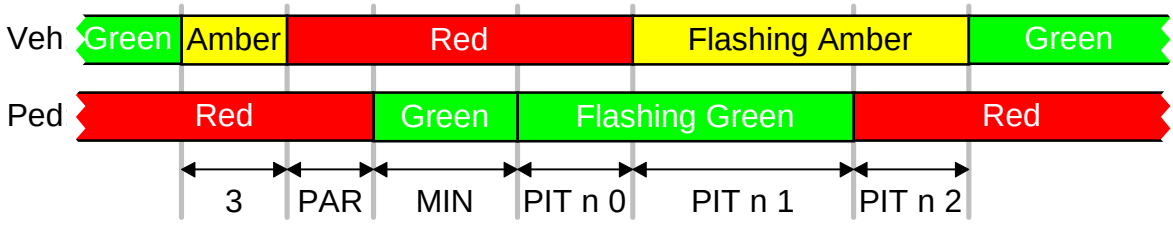
	DESCRIPTION AND REMARKS	
PEV	PEV <Stream Number 0 to 7> : <Setting 0 to 2> **P**edestrian **E**nable **V**ehicle actuated (VA) mode is only applicable to stand-alone pedestrian streams:- 0 = Fixed Vehicle Period operation (VA mode disabled) 1 = VA mode enabled (manual panel can select VA or FVP mode) 2 = VA mode enabled and requested (FVP mode disabled) ***Important:*** The default stand-alone pedestrian configurations may have VA mode enabled. Enter PEV s=0 for each stream to disable VA mode and request FVP operation if no vehicle detectors are fitted. (This command replaces the T400 Pelican command VAD)	3
PTM	PTM <Phase A to F2> : <Enabled (1) or Disabled (0)> Enables and disables **P**re-**T**imed **M**aximum on the requested phase and can be used on either stand-alone or intersection phases.	2
MIN	MIN <Phase A to F2> : <0 to 255 seconds> **MIN**imum green time for the specified phase.	3
MAX MBX MCX MDX	MAX <Phase A to F2> : <0 to 255 seconds> **MAX**imum vehicle green time for the specified phase when running VA mode. If alternate maxsets are used at different times of day, then the 'MAX' times are used during maxset A, and the 'MBX', 'MCX' and 'MDX' times are 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 maximum green time during maxsets E to H. However, on a stand-alone stream, these commands specify the fixed vehicle period when running FVP mode. The 'MEX' times are used during maxset A, and 'MFX', 'MGX' and 'MHX' used during maxsets B, C, and D respectively.	2
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.	2
IPX	IPX <I/O Line Number 0 to 95> : <0.0 to 31.8 seconds> **I**n**P**ut e**X**tension time for the specified input line. Detectors which 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 and IPX times are both non-zero then the IPX and EXT times will be added together.	3

9.3 Pedestrian Timings

Far Sided Pelican Crossing

The vehicle to pedestrian intergreen is controlled by the PAR Pedestrian All-Red period.

The pedestrian to vehicle intergreen is divided into three periods governed by the PIT Pelican Intergreen Times.

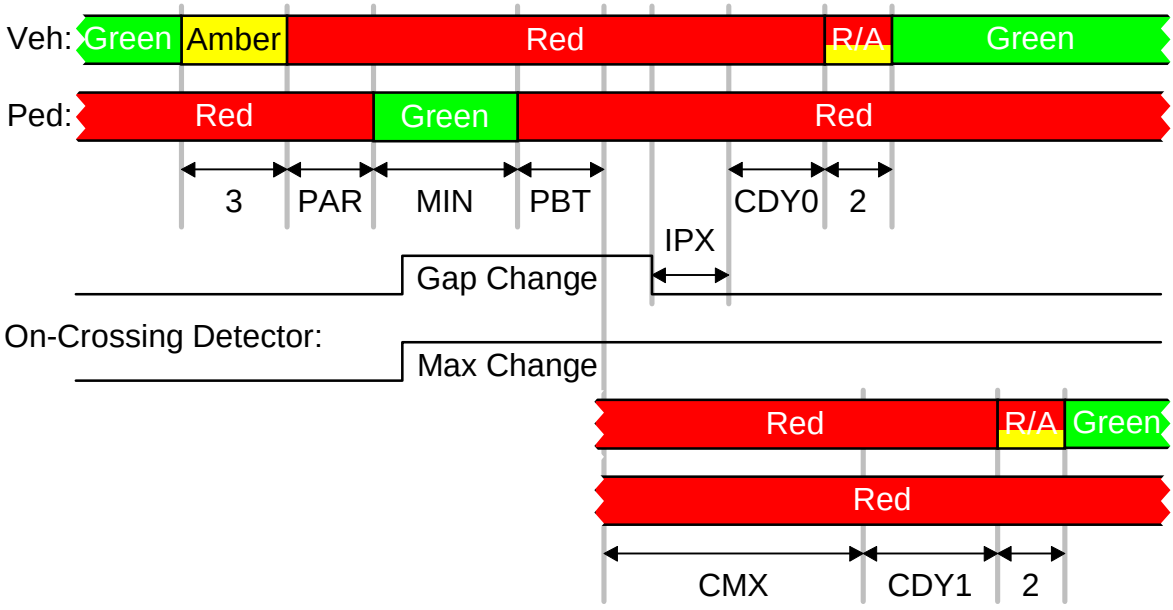


Near Sided Pedestrian Crossing

The vehicle to pedestrian intergreen on a stand-alone crossing is again controlled by PAR, however if the near-sided pedestrian phase is part of an intersection stream, then this period is controlled solely by the IGN intergreen command.

The pedestrian to vehicle clearance period consists of:

- a minimum period governed by PBT p,
- an extendable period limited to a maximum governed by CMX p,
- a gap clearance delay CDY p 0, or
- a max clearance delay CDY p 1. where ‘p’ is the pedestrian phase letter.



On intersections, the appearance of the vehicle phase will be delayed further if the IGN intergreen time is larger than PBT plus the red/amber period.

Far Sided Pedestrian Crossing

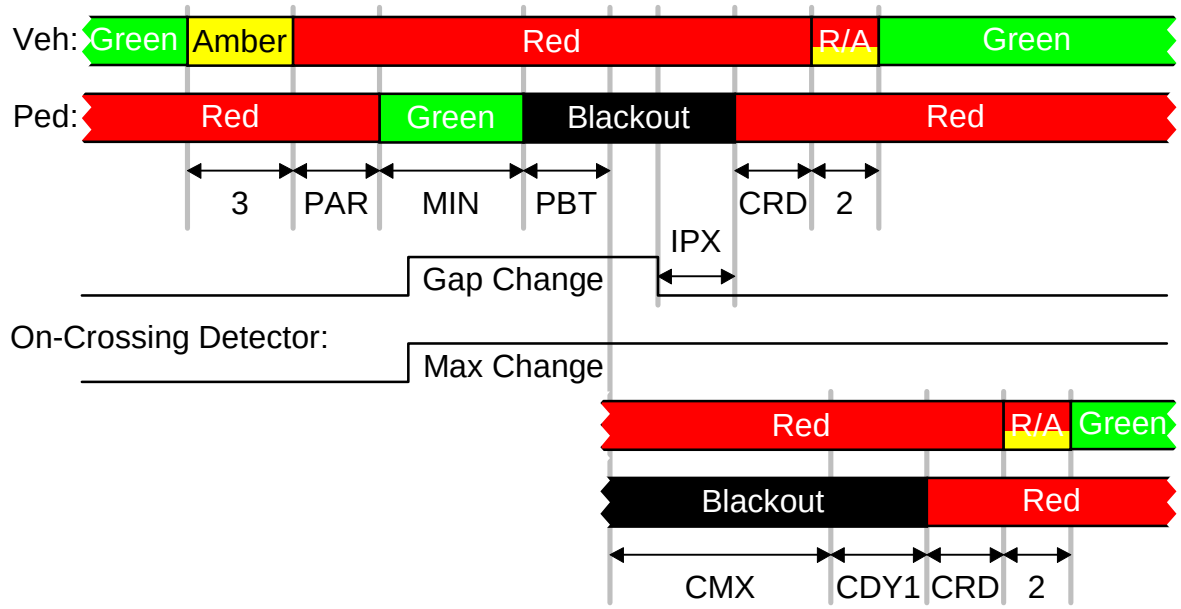
The vehicle to pedestrian intergreen on a stand-alone crossing is again controlled by PAR, however if the far-sided pedestrian phase is part of an intersection stream, then this period is controlled solely by the IGN intergreen command.

The pedestrian to vehicle black-out clearance period consists of:

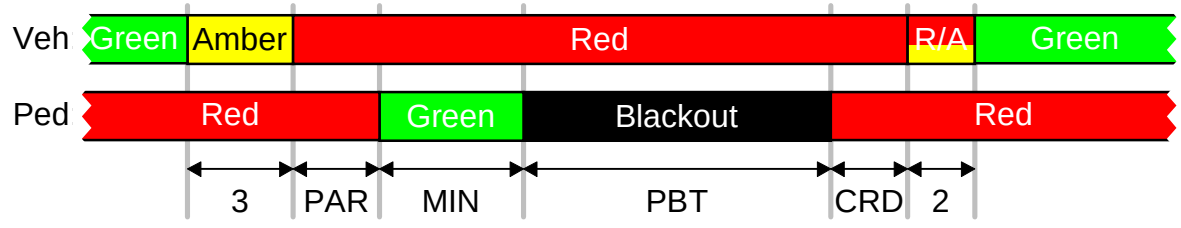
- a minimum period governed by PBT p,
- an extendable period limited to a maximum governed by CMX p,
- a gap clearance delay CDY p 0*, or
- a max clearance delay CDY p 1. where 'p' is the pedestrian phase letter.

Following this black-out clearance period, there is a clearance all-red period CRD p.

* The gap clearance delay CDY p 0 is usually set to zero and hence is not shown on the following diagram.



If a fixed black-out period is required, i.e. with no on-crossing detectors, then CMX should be set to zero so that the black-out period is controlled solely by PBT:-



On intersections, the appearance of the vehicle phase will be delayed further if the IGN intergreen time is larger than PBT plus CRD plus the red/amber period whether CMX is zero or non-zero, but for backwards compatibility, if CMX and CRD are both zero, then the intergreen is controlled solely by IGN even if PBT is set longer.

	DESCRIPTION AND REMARKS	
PAR	PAR <stream number> <change type> : <1 to 3 seconds> **P**edestrian **A**ll **R**ed for each different change type as follows defines the duration of the all red period between the vehicle phase amber leaving period and the pedestrian phase appearing at green: 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 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 stand-alone stream.***	3
MIN	MIN <Phase A to F2> : <0 to 255 seconds> **MIN**imum green time for the specified phase.	3
PIT	PIT <stream number> <intergreen step 0 to 3> : <seconds> **P**elican **I**ntergreen **T**ime for each intergreen step as follows defines the intergreen period between the pelican pedestrian phase and the pelican vehicle phase on the specified stand-alone 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 for Puffin and Toucan crossings)	3
IPX	IPX <I/O Line Number 0 to 95> : <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 which is extendable by the on-crossing detectors is controlled by the CMX handset command.	3

	DESCRIPTION AND REMARKS	
PBT	PBT <Phase A to F2> : <0 to 255 seconds> **P**edestrian **B**lackout **T**ime for the specified phase which may show a flashing green man, depending on the lamp sequence. 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. Note that near-sided signals actually show red during the clearance period, not blackout, and on intersections, the minimum red clearance period will be controlled by the handset command IGN if that is larger than PBT plus the vehicle red/amber time. (This value is ignored on Pelican crossings)	3
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 blackout period (or red on near-sided signals), the pedestrian clearance can be extended up to the time specified by CMX by the on-crossing detectors before running a clearance delay CDY. If CMX is set to zero, then on a stand-alone crossing the pedestrian phase runs only the fixed period determined by PBT, with the CMX and CDY periods ignored. On intersections however, the clearance period would be controlled solely by the IGN command, unless a CRD period is specified on far-sided signals (see CRD for more information). (This value is ignored on Pelican crossings)	3
CDY	CDY <Phase A to F2> <Change Type 0 to 1> : <0 to 3 seconds> **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: CDY p 0 - gap change delay (normally zero on far-sided signals) CDY p 1 - max change delay (These values are ignored on Pelican crossings or if CMX is zero)	3
CRD	CRD <Phase A to F2> : <0 to 3 seconds> **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 on a far-sided signalled pedestrian phase before any conflicting phases are allowed to appear. For intersections, CRD specifies the minimum all-red period. If IGN is set larger than PBT plus CRD plus the vehicle red/amber time then 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. (This value is ignored on near-sided pedestrian phases and Pelicans)	3

9.4 Pedestrian Demand Processing

	DESCRIPTION AND REMARKS	
IPX	IPX <I/O Line Number 0 to 95> : <0.0 to 31.8 seconds> **I**n**P**ut e**X**tension time for the specified input line. Both push-buttons and kerbside detectors can each be given individual extension times using IPX. Where kerbside detectors are configured (and not de-allocated by IOA), a pedestrian demand will only be registered when a push-button input (or its IPX extension) is active **and** a kerbside input (or its IPX extension) is active.	3
PDX	PDX <Phase A to F2> : <1.0 to 5.0 seconds 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 of time before being cancelled.	2
PDD	PDD <phase> : <0 to 3 seconds typically> **P**edestrian **D**emand **D**elay time. This is the delay period that elapses before the controller will start to service a push-button demand, under the following conditions:- 1) Always if running FVP mode. 2) After the pre-timed maximum expires in VA mode. 3) During the all-red quiescent state (if configured). NOTE: The delay is not applied to the illumination of the wait indicator nor to the servicing of UTC demands.	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

9.5 SDE/SA

On a controller which contains no intersection streams, the SDE/SA facility may be configured on the street using the following handset commands while the signals are switched off. If any data is changed, then a fault log entry is raised (`FLF 52:255 SDED`) which keeps the signals off until the controller power is switched off and back on and the new data is accepted.

	DESCRIPTION AND REMARKS	
SDS	SDS : <Value 0 to 2> - <'None'/'SA'/'SDE'> <'INT'/'EXT'> **SD**E **S**elect can be used to select the type of high speed vehicle detection required, if any, on a stand-alone controller while the lamps are switched off, where: 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 of whether the SDE/SA is provided internally by the main processor or externally by the peripheral SDE/SA card.	3
SAT	SAT <Assessor Number 0 to 31> : <Value 1 to 3> (<Phase>,<Type>) **S**DE **A**ssessor **T**ype can be used to select 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 then '4' will be displayed, but if neither SDE nor SA is configured then '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)`'. Note that triple inner and triple outer assessors do not have to be configured on consecutive assessors as the controller treats each assessor completely independently. (This command replaces the T400 Pelican command SDT)	3

If integral SDE/SA is configured so that the main processor performs the SDE/SA function and the peripheral card SDE/SA is not fitted, then the SDE/SA assessor inputs may be re-arranged using I/O allocation command IOA and moved to any physical I/O lines. Also note that the pair of loop inputs for a particular assessor do not need to be configured to adjacent inputs.

If SDE is disabled or all of the assessors configured by IC4 are not required, then these inputs will have no effect on the controller if they are left unconnected. Note that SDE/SA is enabled by default and needs to be disabled using 'SDS=0↵' if it is not required otherwise the Pedestrian All-Red period will be fixed at three seconds.

The following new handset command should be used to commission any ST800 controller which has integral SDE/SA rather than peripheral SDE/SA since without the separate SDE/SA card, the controller has no interface to, and does not require, the SoundMark test set.

For each assessor:

- use SPE and check that the correct loops have been connected to the inputs,
- use SPE and check that the 'a' loop is the first loop that the vehicles cross,
- use SPE and check that the handset display matches the speed of the vehicle,
- use SAT and check that the associated phase and assessor type are correct.

	DESCRIPTION AND REMARKS	
SPE	SPE <Assessor Number> : <Loops> <Ext> <Speed (mph & kph)> Displays the loop activations and the calculated **Spe**ed 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, `0--` when only the first loop (the 'a' loop) is occupied, `-0-` when both loops are occupied, and `--0` 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 without needing a SoundMark test set. However, if peripheral SDE/SA has been configured, this command will just display '`External`' .	R

9.6 UTC

Each stand-alone stream can be configured with a UTC PV input. While that input is active, the vehicle phase will be held at right of way and pedestrian demands will be ignored. When the PV input goes inactive, a pedestrian window period is started during which vehicle extensions are inhibited and any pedestrian demands can be serviced.

	DESCRIPTION AND REMARKS	
UIE	UIE <Stand-Alone Stream 0 to 7> : <0 to 255 seconds> **U**TC **I**nhibit **E**xtensions period for the specified stand-alone 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. Re-applying the PV bit has no effect on the window period, i.e. the vehicle are still inhibited and pedestrian demands are still serviced.	2
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

Refer to the special instructions for the configuration used for the details on what UTC control and reply bits have been provided. As with all external I/O, UTC control and reply inputs and outputs can be re-arranged and de-allocated using IOA.

9.7 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 a UTC 'override to bright' input or a local link 'dim request' input.	2
LKD	LKD <Stream 0 to 7> : <0 to 255 seconds> **L**in**K** **D**elay time for the specified stand-alone stream.	2
LKW	LKW <Stream 0 to 7> : <0 to 255 seconds> **L**in**K** **W**indow time for the specified stand-alone 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 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 logged. The override mode can be selected using LKM.	2
LKM	LKM 0 = 1 enables self-resetting **L**in**K** override timer **M**ode: `LKM 0:0` - When the override timer expires, the controller will disable the PV1 input and revert back 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 and when 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 stream (MCE0145).	2

	DESCRIPTION AND REMARKS	
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 stream (MCE0145). 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 is logged and the pedestrian phase is inhibited the until the fault is cleared. Note that a short pulse on the PV1 input will restart the link fail timers preventing them expiring but will not release PV1 control.	2

9.8 Cableless Link Facility

The CLF influence codes 8 and 9 apply to stand-alone streams:

	DESCRIPTION AND REMARKS	
IFN	IFN <CLF Inf. Set 0 to 7> <CLF Group 0 to 31> : <Function 0 to 9> **I**nfluence **F**u**N**ction, i.e. what function does this group perform in this CLF influence set. The functions 8 and 9 apply to stand-alone streams: 8 - Inhibit Pedestrian Phase (IFS specifies any stage in the stream). 9 - Allow Pedestrian Phase (IFS specifies any stage in the stream).	2
IFS	IFS <CLF Inf. Set 0 to 7> <CLF Group 0 to 31> : <Stage 0 to 31> **I**n**F**luence **S**tage, i.e. which stage (and thus which stream) does this group affect in the CLF influence set.	2

For example, the following commands would set-up plan 0 to allow a pedestrian demand to be serviced during in a two second window starting at time 28 in a 100 second CLF cycle. For the rest of the CLF cycle, the pedestrian phase would be prevented from appearing at right of way.

```
CYC 0:100 ..... Plan 0 has a 100 second cycle time
PLI 0:0 ..... Plan 0 runs influence set 0
PLT 0 0:28 ..... Influence set 0 group 0 starts a time 28 in the cycle
IFN 0 0:9 ..... Influence set 0 group 0 runs function 9 (allow ped)
IFS 0 0:2 ..... Influence set 0 group 0 affects stage 2 (i.e. stream 0)
PLT 0 1:30 ..... Influence set 0 group 1 starts a time 30 in the cycle
IFN 0 1:8 ..... Influence set 0 group 1 runs function 8 (inhibit ped)
IFS 0 1:2 ..... Influence set 0 group 1 affects stage 2 (i.e. stream 0)
```

See the ST800 handset handbook 667/HH/27000/000 for more information.

For those used to a T400 Pelican, the following points should be noted:

- The four T400 influence sets IFA to IFD are no longer provided as the ST800 automatically determines which IFN influences affect which streams from the IFS value.
- The two digit influence codes, e.g. '`IFA 0 0:80`' used on the T400 are now specified separately, i.e. '`IFN 0 0:8`' and '`IFS 0 0:0`'.
- The T400 pelican influences '8' and '9' required the stream number to be specified as the parameter, i.e. '80' for the first pelican and '81' for the second. On the ST800, the parameter is specified in the IFS command and to make this command consistent, it always contains a stage number and so the influences 8 and 9 work the same as the intersection influences 0, 3 and 7 and all require any stage in the stream to be specified. Therefore, the influences for the second pelican would be '`IFN 0 0:8`' and '`IFS 0 0:4`' if stages 1 and 2 are stages in the first stream and 3 and 4 are stages in the second stream.

9.9 Manual Panel

	DESCRIPTION AND REMARKS	
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: MPA 0 - Dim override button - forces signals to bright if pressed. MPA 1 - Computer control LED - lit if any UTC PV bit is active. MPA 2 - Local link disable - disables PV1 on all stand-alone streams. MPA 3 - Remote reconnect - usually configured to set UTC 'RR' bit. Use the following values to assign these functions: 'MPA N:255' Function 'N' not allocated to any button or LED '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'	3

The following handset commands perform similar functions to the MPA manual panel facilities described above:

	DESCRIPTION AND REMARKS	
DOV	DOV : <1 = Override to Bright> **D**im **Ov**erride forces the current dim/bright setting to bright.	2
CCI	CCI <Stream 0 to 7> : <UTC Active> **C**omputer **C**ontrol **I**ndication for the specified stream shows a non-zero value while the UTC PV bit is active.	R
LLD	LLD <Stream 0 to 7> : <1 = Disable Local Link> **L**ocal **L**ink **D**isable will disable the PV1 facility on the specified stream.	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

The following commands are useful if a blank manual panel is fitted:

PEV	PEV <Stream Number 0 to 7> : <Setting 0 to 2> (new - see page 22)	3
PHD	PHD <Phase A to F2> : <Continuous demand (1) > (as ST800)	2
PHE	PHE <Phase A to F2> : <Continuous extension (1) > (as ST800)	2
RDF	RDF : <Request DFM Reset (1) > (as ST800)	2
LPT	LPT : <Request Lamp Test (1) > (as ST800)	2

9.10 Status Command

	DESCRIPTION AND REMARKS	
STS	STS <Stream 0 to 7> : <Mode> <Stage> <Status> **St**atus of the **S**tream has been enhanced to display new stand-alone stream information: For stand-alone streams, the '**mode**' information will be either: 'VAP-MAX' - VA (pedestrian stream) running 'MAX' times. 'FVP-MEX' - Fixed Vehicle Period running 'MEX' times. The 'MAX' and 'MEX' indications may be replaced by: 'VAP-PV ' - when UTC PV (or its pedestrian window) is active, 'VAP-PV1' - when local link PV1 (or its pedestrian window) is active, 'VAP-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 flags up additional useful information. While the stream is running a stage, the display will show either: 'MIN' if any minimum green timers are running, or 'FVP' if the fixed vehicle period is running during FVP mode, or 'MAX' if any maximum green timers are running. While the stream is making a stage to stage move, the display will show one of the following: 'A/R' while an all-red hold is active 'RLM' while any red lamp monitoring delay is running 'DFZ' while any phase delay is running 'PBT' while any minimum clearance period is running 'CMX' while any extendable clearance period is running 'CDY' while any clearance delay period is running 'CRD' while any clearance red period is running 'PAR' while any pedestrian all-red period is running 'SDE' if any speed clearance requests have been actioned	R

9.11 Other Facilities

Other facilities such as those listed below should be detailed in the special instructions in the IC4 print-out for the particular configuration being used:

- Timetable, e.g. maximum green timesets and DFM timesets.
- Audible and Tactile outputs and their control.
- Special detector checking and other conditioning facilities.

10. Fault Log Changes

For the ST800P, a few new fault log entries have been added and some existing ones modified (with the changes highlighted by a line down the right-hand side):

Flag	Description

12 DFM Failure

`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 DFM facility sets '`FLF 12:255`' and one bit in the fault data bytes FLD20 to FLD31 to indicate which line has failed, where the eight bits in FLD20 indicate failures on the eight I/O lines of I/O port 0, etc...

```
FLD 20:XXXXXXXX  -  Failures on port 0
FLD 21:XXXXXXXX  -  Failures on port 1
FLD 22:XXXXXXXX  -  Failures on port 2
••• •• ••••••••  -  (FLD 23 to 28 show failures on ports 3 to 8)
FLD 29:XXXXXXXX  -  Failures on port 9
FLD 30:XXXXXXXX  -  Failures on port 10
FLD 31:XXXXXXXX  -  Failures on port 11
```

Note that the historic rolling log does not record the fault flag and data, but instead interprets the information in a more user-friendly way.

It indicates the I/O line number, e.g. '`L95`', and whether the input failed inactive for number of hours, e.g. '`IN12H`' or active for a number of minutes, e.g. '`AC30M`'.

Once an input has failed, the rolling log will indicate the next time the input changes state, e.g. '`DFM L95 CHNGD`', since DFM faults can only be cleared once the controller has seen the input start working again. When the fault is cleared using 'RFL=1', then an entry such as '`DFM L95 CLEAR`' is placed in the rolling log.

Kerbside detectors may also be checked using a kerbside mat test output which is normally performed once a minute. If this test fails, then a DFM fault is logged in FLF and FLD as above, but the entries in the rolling clearly identify that the detector failed the kerbside test as follows:

When the kerbside test fails, an entry such as 'DFM L11 KERBF' is placed in the rolling log and the kerbside input is forced active.

Flag **Description**

If the kerbside test subsequently passes five times in succession, then an entry such as 'DFM L11 KERBP' is placed in the log and the detector is no longer forced active (although the FLF and FLD entries remain in the fault log).

When RFL=1 is entered to clear the fault log, it will automatically initiate a kerbside test. If the kerbside detector passes this test then the FLF and FLD entries are cleared and a 'DFM L11 KERBC' entry is placed in the rolling log.

21 Configuration / Firmware Not Compatible

`CPAT FLF 21:255, FLD 7:N, FLD 8:X, FLD 9:Y`

If the configuration data and the firmware are not compatible, normally because the configuration requests a facility not available in the firmware, then this fault will be set and the signals will be extinguished.

FLD 7 identifies the source of the incompatibility, with additional information held in FLD's 8 and 9.

All these compatibility faults except FLD 7:10 (EPLD) are usually caused by the firmware issue being an older issue than the configuration data requires. 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 print-out.

`FLD 7:1` - Compatibility number
`FLD 8:X` - Firmware compatibility number
`FLD 9:Y` - Configuration compatibility number

`FLD 7:2` - Unknown facility requested in the facilities table, see 'FAC'
`FLD 8:X` - Facility number
`FLD 9:Y` - Value

`FLD 7:3` - Unknown configuration item
`FLD 8:X` - Item identity given by X + Y x 256
`FLD 9:Y /`

`FLD 7:4` - Invalid configuration data
`FLD 8:X` - Item identity given by X + Y x 256
`FLD 9:Y /`

Flag **Description**

FLD 7:5 - Invalid lamp sequence command
FLD 8:X - Phase (where zero represents phase A)
FLD 9:Y - Command

FLD 7:6 - Invalid conditioning command
FLD 8:X - Command code

FLD 7:7 - Conditioning timer out of range
FLD 8:X - Timer number given by X + Y x 256
FLD 9:Y /

FLD 7:8 - Attempted access outside conditioning array
FLD 8:X - Offset given by X + Y x 256
FLD 9:Y /

FLD 7:9 - Invalid controller base time date parameters
FLD 8:X - Day (Only January 1st supported by earlier issues)
FLD 9:Y - Month

FLD 7:10 - Requested facility is disabled by the EPLD.
FLD 8:XXX - PLD variant as shown by the command 'PLD'
8:0 - Variant /000, or
8:101 - Variant /101 for example.
FLD 9:Y - PLD facility number, where…
9:0 - Unrecognised PLD variant.
9:1 - Lamp monitoring not permitted.
9:2 - Integral SDE/SA not permitted.
9:3 - No intersection streams permitted (stand-alone's only).

FLD 7:11 - Conditioning attempted access outside extended fetch array
FLD 8:X - Offset given by X + Y x 256
FLD 9:Y /

44 Lamp Switch Card Fault

LSC FLF 44:N

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

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.

Flag **Description**

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
To 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 ST800P Card Required
The configuration requires a single four phase ST800P lamp switch card but an eight phase card has been detected. See the lamp monitoring section.

51 SDE/SA Card Fitted But SDE/SA Disabled

SDEN FLF 51:255

A stand-alone controller will report this fault on power-up and not illuminate the signals if a peripheral SDE/SA card is detected but either:

- SDE/SA is not configured,
- Integral SDE/SA is configured, or
- SDE/SA has been disabled using the 'SDS' handset command.

52 SDE/SA Data Changed By Handset

SDED FLF 52:255

On a stand-alone controller, the SDE/SA facility can be configured using various handset commands while the signals are switched off. This fault is raised when any configuration data is changed and stops the signals being switched on until the controller is powered off and back on and the controller begins using the new data. Note that the fault is automatically cleared by switching the power off and back on, RFL=1 does not need to be entered.

Flag **Description**

53 Local Link PV1 Fail Active or Inactive Timer has Expired

`LINK FLF 53:255, FLD 80:00000001`

The PV1 input on the stand-alone stream identified in the fault log 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.

11. Fault Information

Site name: Date / Time: / / :

Engineer's name: Telephone:

Reason for visit:

Controller Checks Before Resetting Faults

Are the signals still on?	On ❑	Off ❑	System error LED?	On ❑	Off ❑
Green heartbeat LED?	On ❑	Off ❑	Bus error LED?	On ❑	Off ❑
If on, is it still beating?	Yes ❑	No ❑	Watchdog error LED?	On ❑	Off ❑

Enter the following commands and record the responses:

`TOD`	`PIC`
`CIC`	`SIC`

Type 'FFS' and use the '+' key to scroll through the currently active fault log flags until 'FFS END OF LOG' is displayed.

`FFS`	`+`
`+`	`+`

Type 'FDS' and use the '+' key to scroll through the currently active fault log data until 'FDS END OF LOG' is displayed:-

If FFS 55 was set, i.e. if ‘FFS 55:255 LAMP’ was displayed, then enter ‘KLD’ and use the ‘+’ key to scroll through the lamp faults until ‘KLD END OF LOG’ is displayed and record each entry below :-

`KLD s a:nnnW p/ccccc`	☑ ☒	Examine the lamps around the junction.
	❑ ❑	Replace any lamps which have been correctly reported as failed by KLD, tick the associated box and check that the fault is automatically cleared after about 10 seconds.
	❑ ❑	If no lamp fault can be found on the junction for the displayed phase and colour, put a cross in the box and refer to the ‘lamp monitor’ section of the handbook.

Serial Numbers

If the controller's power needs to be switched off in order to fix/clear the fault(s), then take this opportunity to record the board issues and serial numbers of the ST800 cards. Record the issue states and serial numbers of the main processor card, the power distribution circuit board and all of the lamp switch cards fitted.

CPU:	Power:	L/S #0:
L/S #1:	L/S #2:	L/S #3:

Controller Checks After Clearing Fault

Are the signals on?	Yes	❑	No	❑
Is the green heartbeat LED on and beating?	Yes	❑	No	❑
Is the red system error LED off?	Off	❑	On	❑
Is the lamp monitor learnt? (i.e. '`KML:Complete`')	Yes	❑	No	❑
Is the time/date set-up correctly?	Yes	❑	No	❑

Use 'LOG' to look back through the historic rolling log and record the last few events. Press 'SP' (space) and then the '+' key to view the latest few records:-

Date	Time	Event(s)

Record any relevant information in the controller's log book and record below the date, time and reason for the previous visit as described in the log book:-

Any another comments?