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SYSTEM/PROJECT/PRODUCT: ST800 / ST700 Road Traffic Controller

USE OF ST800 AND ST700
FIRMWARE AND HARDWARE
CONFIGURATIONS

THIS DOCUMENT IS ELECTRONICALLY HELD AND APPROVED

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Issue	Change Refs:	Date:
2	TS000244	14/11/2000
3	n/a	29/10/2001
4	TS001019	27/05/2002
5	TS002353	16/12/2004
6	TS002501	08/05/2006
7	TS002385/TS005125	23/06/2009
8	TS005637	06/09/2010
9	TS006062	13/05/2011
10	TS006466	23/02/2012
11	TS006754	18/10/2012

CONTENTS

1 ST800 FIRMWARE DESCRIPTIONS

1.1 PB800 ISSUE 1

Not Generally Released.

1.2 PB800 ISSUE 2

Not Generally Released.

1.3 PB800 ISSUE 3

This is the first standard production issue of the ST800 firmware.

1.4 PB800 ISSUE 4

- The number of phase delays has been increased from 60 to 120.

- If the controller's free-time falls too low then the signals are switched off and a watchdog fault is raised.

- The improved UTC input debouncing algorithm added to later issues of the T400 has now been added to the ST800.

- Lamp monitor 'reset and relearn' inhibited if there is a 2nd red lamp fault active.

- Entering RPL=255 can now be used to 'isolate to VA' a controller that is running in CLF mode in a similar way to RPL=1 allows the user to start plan 1.

- On-street configuration (export facility) now picks up the configured phase type and lamp monitor type from each lamp sequence set rather than using the default arrangement.

- The Configuration PROM now includes the IC4 data file.

1.5 PB800 ISSUE 5

- The controller can now be fitted with different variant EPLD's allowing them to be used as dongles to enable and disable various facilities.

- The main processor can now provide the SDE/SA facility and the separate SDE/SA card is no longer required for Pelican, Puffins and Toucans. To enable use of this facility on intersection controllers, a new EPLD is required.

- The Siemens 3U OMU can now monitor directly through the ST800 handset port negating the need for additional lamp monitoring toroids and additional wires to pick up detector inputs and green states.

- The controller now includes the ripple change facility.

- Extension times can now be specified on an input basis as well as one per phase.

- The CLF base time can now include any date, not just January 1st.

- Handset command 'KML=1' (lamp monitor learning) automatically performs the dim/bright changeovers and inserts artificial demands for all phases.

- The lamp monitor will now learn tubes types in the initial bright state even though it has not confirmed the state of the lamps following a dim/bright change.

- A new lamp monitor type has been added: green-arrow with amber but no red.

- Serial loading of the configuration data should not be used (see issue 9)

1.6 PB800 ISSUE 6

- The controller now supports Pelican, Puffin and Toucan stand-alone streams as well as Puffin and Toucan phases on intersection streams to TR0141C.

- Self-test is enhanced indicate if the controller is wired for fail to flashing.

- A GPS unit can be connected to the controller to keep the controller clock synchronised.

1.7 PB800 ISSUE 7

- TC12 Upload/Download Facility now available.

1.8 PB800 ISSUE 8

- Self-test modified to reduce current surges on ST800P controllers.

- 'Extend all red' facility corrected (problem on issues 6 and 7 only).

1.9 PB800 ISSUE 9

- Holiday Clock facility added. NB: 16 CLF plans not yet available (see issue 12).

- A facility has been added to fail to part-time on a stream basis when correspondence errors are detected between requested and actual lamp states.

- Improved fault log data processing, to recover corrupt log entries, where possible.

- The self-test facility has been enhanced and problem with self-test on export controllers corrected.

- The manual step-on mode now ignores the inputs from the scanned manual panel so only the inputs from special conditioning are used to enable and control manual step-on mode.

- Problem with handling of pedestrian phases 'appearance type 2' on certain junction configurations now corrected.

- Serial loading of the configuration data from IC4, via the handset port, is now available.

1.10 PB800 ISSUE 10

- The monitoring of flashing green has been modified for export only.

- Lamp monitor dim/bright thresholds adjusted.

1.11 PB800 ISSUE 11

- High dim voltages settings now catered for by new KDP value (KDP=2).

1.12 PB800 ISSUE 12

- 16 CLF Plans now available.

1.13 PB800 ISSUE 13

- No issue 13 firmware PROM was produced.

1.14 PB800 ISSUE 14

- The 'Serial MOVA' facility now available – The ST800 and a combined Siemens OMU / MOVA unit communicate solely over the enhanced 141 serial link.

IMPORTANT: For Gemini and Controller compatibility information, ALWAYS refer to the appropriate documentation for the Gemini unit to be used, e.g. the UTMC OTU/MOVA Handbook 667/HB/31601/000.

1.15 PB800 ISSUE 15

- The controller can now return data in all 14 integral OTU reply words, not just the first 4 as on the T400.

1.16 PB800 ISSUE 16

- This issue is the first issue of the Main Processor Firmware that also runs on the new ST700 traffic controller. The ST700 comes in two guises: the ST700P 2-Phase Single / 4-Phase Dual Pedestrian Controller, or the ST700SE 6-Phase Small Export Intersection controller. Functionally the ST700 is very similar to the ST800P and ST800SE controllers, although mechanically it is very different. The ST700 also includes the following new features:

- The Pedestrian signals can be driven directly at 48v RMS (using the special ST700 dimming transformer), negating the need for individual 230v/48v transformers on each aspect. Also see the ELV handset command in the handset handbook.

- Dedicated outputs for driving audible units and/or the tactile interlock.

- The basic ST700 without expansion I/O cards has 32 digital inputs, 8 digital outputs and 8 external lamp monitor channels. Twice as many as the basic ST800P / ST800SE.

- Cables for the lamps and digital I/O can be wired directly to the screw-terminal connectors on the ST700, although 'soft-wire' kits to terminal blocks mounted on a separate panel are also available as an option.

In addition, this new firmware also provides the following new features that are available on both the ST700 and the ST800 traffic controllers:

- A pre-timed maximum 'extra' period can be configured using the new PTX handset command. If the opposing demand arrives after the pre-timed maximum period has expired (or is close to expiring), the maximum green timer is restarted with the PTX time. This prevents the vehicle phase terminating the instant a push-button is pressed for example, if vehicle extensions are still present, even though the normal pre-timed maximum period has already expired.

- The engineer is now warned (using the fault 'FLF 51:255 SDEN') if SDE/SA is enabled but no SDE/SA assessors are allocated to real inputs, e.g. after loading one of the default pedestrian configurations. Also see the SDD handset command.

- When a single lamp monitor sensor is used to monitor all three aspects of a pedestrian phase, e.g. phase B, the firmware will report lamp faults against 'B/Red', 'B/Green', 'B/Red,Wt' and now also 'B/Wait'. Therefore, either a 'B/Red' or a 'B/Wait' lamp fault will now normally accompany a 'B/Red,Wt' lamp fault.

1.17 PB800 ISSUE 17

- More thoroughly tests the ST700 hardware during normal operation.

- Allows the engineer to obtain 'level 3' handset access without having to lift off the ST700 cabinet. If the handset port is extended to the manual panel, then the engineer can now obtain Level-3 access by pressing the 'Lamp Test' button within 30 seconds of entering the PME access code. Alternatively, if a full manual panel is not fitted (but a door switch still is) then the engineer can, within 2 minutes of opening the manual panel door, enter the PME access code and then 'LEV=3' to gain level 3 access.

- Previously, remote handset access to the controller via an Integral OTU or TfL IMU would be locked-out when anything was connected to the controller's handset port. This meant that remote handset access was prevented when a Serial MOVA was used since it physically connects to the handset port even though it does not send handset commands.

  This new firmware now distinguishes between a physical connection (i.e. something physically connected to the controller's handset port) and a logical connection (i.e. handset commands actually being used locally). Thus, remote handset to the controller will no longer be locked-out when a Serial MOVA unit is fitted, unless an engineer locally is actually sending handset commands to the controller via the MOVA unit.

The following note should be appended to the IC4 Help on 'MOVADETn' on the 'Conditioning Mnemonics – UTC' help page:

"Note that the interaction between the 'processed' MOVA detectors, i.e. those defined on the 'Serial MOVA' screen, and these conditioning mnemonics was

modified for PB800 issue 17. If problems are experienced, contact Siemens Engineering at Poole (ref. Enhancement report ST800-109)."

1.18   PB800 ISSUE 18

This issue **must be used** in **ALL ST800's and ST700's for TCSU-London** (now TfL) since this issue is the first to fully support their IMU card.
All other ST800 and ST700 controllers can use this new issue or continue to use previous issues of the firmware.

- Issue 18 is the first issue of the ST800 and ST700 firmware that fully supports the London IMU (see section 2.5). Issue 17 of the firmware should not be used with the IMU.

- The following items have been added to the TC12 UPDL Pedestrian Data Group: PTX, SDD and ELV.

- Fix problems with timetable resynchronisation immediately after holiday clock special days and special periods. Ref: Problem Report ST800-113.

- If a configuration is downloaded into an ST800 but the original configuration PROM is left in place, then the firmware issues 14 to 17 would not log the fault "FLF 15 DIFC" immediately. The fault would only be logged on subsequent power-ups. Ref: Problem Report ST800-117 (also see ST800-85).

- The following fault has been fixed: If a configuration is downloaded into an ST700 or ST800 but the controller is told not to use it, then the controller will shutdown when asked to perform any upload / download actions (by an integral TC12 OTU or TfL IMU). Ref: Problem Report ST800-118.

- The self-test has been improved so that it re-tries the first SSR test if it fails in case the test has only appear to have failed due to the effects of a dimming transformer. In addition, holding down the level 3 push-button now speeds up the self-test. Ref: Enhancement Report-119.

Operation of the lamp monitor at 110/115v nominal supply has been improved so the KES handset command shows the actual current being measured (not the equivalent 240v current for the same load). Also, on an ST700, the 110/115v feeds should just be passed through the centre of the external toroids once to give the full 4Amp range of the toroid. They should not be wrapped around twice like 230v feeds since this limits the current to around 2Amps. Ref: Problem Report ST800-120

This issue also clears the following problem reports:

- ST800-113 - Timetable Resynchronisation After Holiday Clock Events. Resynchronisation of the timetable just after special days or special holiday periods would not always result in the correct timetable events and plans being invoked. The firmware would not always realise that 'yesterday' was a special day or a special period. This has now been corrected so that 'resync' of the timetable produces exactly the same conditions as if the timetable has been running normally up to that point.

- ST800-117 - FLF 15 DIFC" Not Always Logged.
  If a configuration is downloaded into an ST800 but the original configuration PROM is left in place, then the firmware issues 14 to 17 would not log the fault "FLF 15 DIFC" immediately. The fault would only be logged on subsequent power-ups.
- ST800-118 - Upload / Download (OTU or IMU) Shutdown.
  The following fault has been fixed: If a configuration is downloaded into an ST700 or ST800 but the controller is told not to use it, then the controller will shutdown when asked to perform any upload / download actions (by an integral TC12 OTU or TfL IMU).
- ST800-119 - Self-Test Improvements: SSR Test and Speed-Up – Enhancement
  The self-test has been improved so that it re-tries the first SSR test if it fails in case the test has only appear to have failed due to the effects of a dimming transformer. In addition, holding down the level 3 push-button now speeds up the self-test.
- ST800-120 - Improvements For 110/115v Operation – Enhancement
  Operation of the lamp monitor at 110/115v nominal supply has been improved so the KES handset command shows the actual current being measured (not the equivalent 240v current for the same load). Also, on an ST700, the 110/115v feeds should just be passed through the centre of the external toroids once to give the full 4Amp range of the toroid. They should not be wrapped around twice like 230v feeds since this limits the current to around 2Amps.

1.19 PB800 ISSUE 19

- Allows upload / download through the handset port using the Enhanced Serial Port protocol as used by semi-integral OMU's and serial MOVA units. This will allow IC4 to upload and download changes made to handset alterable data – IC4 release due towards the end of 2002.

1.20 PB800 ISSUE 20

- Problem corrected where range errors were incorrectly returned for upload/download of new values of TSD (450) and TSH (451).

- The Self-Test Sequence fails on the MDU boards for Germany because the software sees no drop in lamp supply when it activates the dim/bright relay. This is due to these boards having no dim/bright relay. The sequence has been modified so that if a handset is plugged in it asks a question before failing the dim/bright test. If no handset is plugged in, then the test would fail immediately as it does now.

1.21 PB800 ISSUE 21

A new handset command RLS has been implemented which allows the speed of confirmation of a first red lamp failure to be changed. For details see the Handset Handbook issue 6 or later.

1.22 PB800 ISSUE 22

Firmware modified to support the TfL TCAM Outstation

1.23 PB800 ISSUE 23

- Improvements have been made to the RTC Clock facility to improve its accuracy when the time is set from and checked by a TfL TCAM Unit.

- If a cabinet / manual panel door switch is fitted, the firmware now logs 'DOOR OPEN' and 'DOOR CLOSED' appropriately and automatically exits Manual mode when the door is closed.

- The addition of a UTC Force Bit Watchdog facility which disables UTC mode when any UTC stage force bit is active for more than a configurable number of seconds. UTC mode is allowed again as soon as the force bit is released (see FLF 60). The default is set to 'UWD:20' (i.e. 200 seconds)
  NOTE - This facility must be manually disabled (using UWD=0) if a freestanding MOVA unit is using the UTC I/O interface. The facility is automatically disabled when Serial MOVA is used.

- The following new lamp monitoring types have been added -
  a) **Special 2 "R,xG,A"** – Red and Amber only, don't monitor green. For example, when LED green-arrows that cannot be lamp monitored are fitted with normal Red and Amber lamps.
  b) **Special 3 "R,xG,xA"** – Red only, don't monitor green or amber. For example, when Helios LED signals are used and only the red can be monitored (e.g. has a Helios CLS LMF fitted) to allow Red Lamp Monitoring.
  c) **Special 4 "R,G,xW"** – Red and Green only, don't monitor 'wait' (or the red while the 'wait' is illuminated). For example, when LED WAIT' or 'Demand Accepted' indicators are fitted that cannot be lamp monitored. This type can also be used on a traffic phase to ignore the amber and only monitor the Red and Green while the amber is not illuminated.

- The recording in the rolling log of either POWER OFF/ON or "FLF 17:255 LSUP" on any mains break or brownout that causes the traffic signals sequence to restart, even if the break or brownout is only short does not cause the Controller to power down.

1.24 PB800 ISSUE 24

- Issue 23 may become stuck in a stage if the configuration has more than one stage-stream configured and phases with appearance type 1 or 3. This has been corrected.

- Improvements have been made to the UTC Watchdog facility. Firstly, the UWD handset command includes a range check and displays the value in seconds. Secondly, problems have been reported with special conditioning libraries that use scratch bits to set force bits. To correct these, the check is now automatically disabled if special conditioning disables UTC mode or prevents the forced stage.

- After an RLM fault has been cleared, the RLM Inhibit is still applied while the phase can appear in the current stage to prevent the phase appearing late in that stage. However, if the controller is resting in this stage with no other demands

present, the phase will not re-appear. To correct this, the start-up demands are inserted until the RLM Inhibit is released.

1.25 PB800 ISSUE 25

Not generally released (trial sites only)

1.26 PB800 ISSUE 26

- Supports "LED Lamp Switch" Cards in order to lamp monitor Helios CLS LED Signals on ST800 (without needed LMF Modules – NLM); see 667/HB/32921/007. For the ST700, see PB800 issue 27.

The following features from early versions of PB801 (ST900) firmware are now also available in this release of PB800:

- The lamp supply voltage when a fault occurs and unexpected lamp load increases are now recorded in the rolling log (LOG).

- Re-entering the PME access code or changing level-2 or level-3 data retriggers the access level timeout period.

- The handset command DSF (Detector State on Failure) automatically jumps to the first / next faulty I/O line and displays the I/O line's name, e.g. "DSF 3 PEL1PB1:0".

- The handset command ELV displays more helpful information, e.g. "ELV:1 (ELV WAITS)".

- The handset command FFS (Fast Fault Scan) displays the handset command required to view the fault data associated, e.g. "FFS 55:255 LAMP, see KLD".

- The handset command KES (Engineering current Sensor) on a wide terminal also shows the voltage and learnt load, e.g. "KES 2: 806mA 226V B/RLMRed:202W".

- The handset command KEV can now be used to calibrate the lamp supply voltage reading.

- The handset command KML (Monitor Learning) shows the sensor number in addition to the phase/colour, e.g. "KML:A/Amber(S1) 25%".

- The interaction between the handset commands KRD and KLR has been improved.

- The handset command SLL allows the user to enter =1, =2, etc. to specify a number of lamps to simulate.

- New fault "FLF 61:255 TKE!" set if initialisation does not occur.

1.27 PB800 ISSUE 27

- Supports "LED Phase Driver" Cards in order to lamp monitor Helios CLS LED Signals on the ST700 (without needed LMF Modules – NLM); see 667/HB/32921/007 issue 6 or later.

The following features from ST900 firmware (PB801 issue 11) are also available in this release of PB800:

- The problem with the 'KDP:2' setting and LED Signals has been fixed (ref 0008551 and ECB10-0125).

- Adds the Siemens Silux LED Profile (KLV:7/8 and KLT s:11)

- Corrections to various handset commands:

    - KTR improved to show the day of week and an asterisk to mark the most recent record (ref 0009571)

    - KES displays clearly identifies when no reading has been taken or the reading has been forced to zero, rather than displaying '0mA', (ref 0004929); see 667/HH/32900/000 for details (issue 6 or later).

    - KES and KTR correctly display the supply voltage of 48V sensors on the ST700 controller (ref 0009791 & 0009800)

    - The interaction between the KLT and RLM commands has been improved; if a sensor is disabled by KLT s=0, the number of RLM channels shown by the RLM command is reduced (ref 0009792).

1.28 PB800 ISSUE 28

Not generally released.

1.29 PB800 ISSUE 29

The following new facilities have been added. For details refer to 667/HB/27000/000 issue 8 or later.

- 'Last Red' Monitoring

- Smooth CLF for base-time CLF

- Smooth Linked Fixed Time

1.30 PB800 ISSUE 30

Initial modifications for Hong Kong LED Retrofit:

- Adds support for lamp monitoring Panasonic and Ketc LED Signals on the ST800 Controller (KLV:12-16 and KLT s:12 to KLT s:17).

- Adds the KRM and KNL handset commands to allow Last Red Monitoring to be enabled without the need to update the Controller IC4 configuration.

- Adds the KSN and KSL handset commands to adjust the switch on delays before normal lamp monitoring and last red lamp monitoring commences.

Note: PB800 issue 30 was never released in to production.

1.31 PB800 ISSUE 31

Further modifications for Hong Kong LED Retrofit:

- Adds the KRW handset command to allow LED Lamp Monitoring on sensors when Amber (Wait) Indicators are configured on for Pedestrian Phases.

2   FIRMWARE - COMPATIBILITY

2.1   GENERAL

It is <u>not</u> compatible with any T400 firmware issues, T400 configuration PROM's or the T400 CPU or phase driver boards.

The ST800/ST700 firmware PB800 is not compatible with an ST900 CPU Card, nor does it support the ST900's serial I/O cards or ELV LSLS cards.

The ST800 and ST700 CPU cards are still compatible with the T400 manual panel and the T400 extended system bus, i.e. T400 expansion I/O cards, SDE/SA card and the Integral OTU. From PB800 issue 18 onwards, it is also compatible with the IMU card as long as the IMU firmware is PB581 issue 5 or higher.

The ST800 Main Processor firmwares PB800 issue 2 onwards are all compatible with the ST800 Phase Bus Processor firmware PB815 issue 2 (or later).

PB800 issue 16 is the first issue of the controller firmware that also runs on the ST700 controller. Previous issues of PB800 firmware do not execute on the ST700.

On the ST700, the main processor firmwares PB800 issue 16 onwards are all compatible with the ST700 Phase Bus Processor firmware PB817 issue 3 (or later).

2.2   ST800P, ST800E AND ST800SE

Note that the ST800P, ST800E and ST800SE are all variations on the basic ST800 platform and all run the same ST800 firmware, but note that only PB800 issue 6 (or later) supports the sub-equipped four phase lamp switch cards.

ST800P........is a four phase stand-alone pedestrian controller in an 11" rack. Has two RLM channels per vehicle phase built into the special four phase lamp switch card but no other on-board lamp monitoring to reduce cost.

ST800E ....is a 32-phase ST800 export controller: to reduce the cost it has no lamp monitoring capabilities for example.

ST800SE .....is a 4 or 8 phase export controller in an 11" rack.

ST800P and ST800SE Firmware PROMs: The main processor firmware must 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 PCBs and to provide the new stand-alone pedestrian facilities.

PLDs - Until now, most ST800 CPU PCBs have been fitted with the original /000 variants of the PB820 and PB821 PLDs. However, a number of variants of the PB821 PLD2 have been produced to limit the facilities that an ST800 is allowed to run.

The handset command 'PLD' displays the variant of PLD2 currently fitted and a short description. Self-test also displays 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 nor 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 controllers are, by default, 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 automatically disables the second stream and runs 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. 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 configurations then the controller reports a compatibility fault and does 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 is 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.

2.3   ST700

The ST700 is functionally very similar to the ST800; indeed it runs the same Main Processor firmware as the ST800. More details on the ST700 can be found in section 1.16, which describes the first issue of PB800 firmware that also runs on the ST700.

ST700P........is a 2-phase single or 4-phase dual stand-alone pedestrian controller. It has two RLM channels per vehicle phase built into its lamp switch card but no other on-board lamp monitoring to reduce cost (although up to 8 external toroids can be fitted). It can also drive the pedestrian wait signals or all the pedestrian signals directly at 48v RMS, using a special dimming transformer, negating the need for individual 230v/48v transformers for each aspect.

ST700SE .....is a 6-phase small export controller, with no on-board lamp monitoring capabilities (although external toroids can be fitted as on the ST700P).

2.4   INTEGRAL OTU

Control and Reply only

For use with an integral OTU to give the facility for control and reply the required software should be PB392 Iss.6 or greater.

If the Upload/Download* facility is Required
To facilitate the uploading and down loading from an integral OTU it is required that the software be to issue 7 of PB 392 and issue 2 of PB 393 PLD /104 or /105.
(* The Upload/Download facility includes Remote Handset)

2.5   LONDON IMU

The London IMU is an add-on integral PCB for Transport for London (T*f*L). The Integral Monitoring Unit (IMU) is also known as the TCSU Integral OMU or Integral Facilities Card (IFC).

IMPORTANT: The issue of IMU firmware in PROM and the issue of IMU firmware downloaded into RAM do not have to be the same. However, both must satisfy the following table and both must be of the same 'PB-number', i.e. both must be PB581 in an ST800 Controller. You cannot mix PB580 and PB581 in the same IMU.

PB580 all issues	Not compatible with the ST800 and ST800 controllers.
PB581 issues 1-4	Not compatible with the ST800 and ST800 controllers.
PB581 issue 5	These RAM and PROM software released include support for the ST800 and ST700 traffic controllers as well as being backward compatible with the T400 controllers. This requires PB800 issue 18 or later (see section 1.18)
PB581 issue 6	Not released.
PB581 issue 7	Same as PB581 issue 5, also now compatible with DynaLink Modem.
PB581 issue 7.1	Released to TfL for evaluation. Provides support for a GSM modem.
PB581 issue 7.2	Longer Instation password timeout for use with a Bus Processor. This release for test purposes does not include the changes for 7.1.
PB581 issue 8	Formal release identical to issue 7.2.

3   FIRMWARE - KNOWN PROBLEMS

None

4   FIRMWARE - RESTRICTIONS AND LIMITATIONS

This issue of firmware has the following restrictions and limitations registered against it.

- ST800-29 - Lamp Monitor Fluorescent Tube Loads.
  The lamp monitor software calculates loads from the peak voltage and current readings. This leads to erroneous values of load for fluorescent tubes as the current peaks at a different time to the voltage. A better indication of the load could be calculated if the software took into account where the peak current reading occurred within the additional current reading slots.

- ST800-40 - CLF Actions with the Same Time
  If several actions on the stream are specified at the same offset time within the cycle, only one is actually actioned and the others are ignored.
  The work-around is to specify each action at one second intervals (this also guarantees the order of execution).

- ST800-55 - Priority DFM Auto-Reset
  TR0141C now includes the following requirement:
  5.10.2.15 The detector output may be either manually or automatically reset. Automatic reset shall only occur after at least 15 operations of the detector output.
  The firmware currently does not wait for 15 good operations.

- ST800-59 - Handset Lock-Up (XON/XOFF)
  Occasionally, when using a VAX terminal as a handset, the handset appears to lock-up and stops working until the terminal's communications are reset. It appears to be something to do with the terminal being configured to use XON/XOFF for flow control rather than CTS and RTS.

- ST800-63 - CLF with Entry Timers
  At 12:00:00, the timetable says change from plan 0 to plan 1, but the controller continues to run plan 0 for 10 seconds due to plan 1's entry time set to 10 (correct). However, for a split second at 12:00:10, the controller falls back to VA mode before starting plan 1. (Both base time and non-base time CLF).

- ST800-80 - Power Fail Time Not Accumulated
  When the power is switched off, the duration of the power failure is accumulated in the real time clock IC. Normally the controller uses this to adjust its real time clock when power returns. However, if real time clock has not yet been set-up (or has been cleared after a corruption), then the controller does not add in the power-off duration so all power fail durations appear very short in the rolling log, i.e. of the order of a few seconds.

- ST800-94 - 'TOT' Does Not Use The 'TO' Bit, Just A 'TC' Bit
  The 'TOT' handset command is supposed to change the function of the 'Computer Control LED' (see MPA 1) so that the LED is active when the 'TO' bit is active, not just when the 'PV' bit is active. However, this function only works with 'TC' bit since the 'TO' bit is currently only handled by conditioning.

- ST800-95 - RLM Faults Logged Instead Of Correspondence Faults
  During ST700 system test, the following was notice. If the red aspect (which was on) is shorted to the green aspect (which was off) in order to cause a correspondence fault, the controller would report feeder failure on the red aspect as well as (or even instead of) the green correspondence fault. This only occurred if green lamps were connected and the short was applied when the red aspect was already illuminated.
  It is believed that the high initial current taken by the green lamps from the red drive saturates the on-board sensor so the readings at mains peak appear very small. Therefore, a feeder failure is logged since the RLM confirmation time is smaller than the time to confirm a correspondence fault.

- ST800-97 - TimeSwitch Events – Input/Output
  The timeswitch events to force inputs and outputs either active or inactive by time of day appear to be inverted.

- ST800-121 - Although it is possible to configure a stand-alone pedestrian stream on an ST800 intersection controller with more than one vehicle phase to provide more than one red lamp monitored approach, care must be taken as to how the vehicle timings are configured. Under basic pelican VA mode, it does not matter which vehicle phase is assigned the detectors and the timings, that phase will always hold the stage for the required extension and maximum green times. However, the pelican CLF influences do not seem to work correctly if the detectors and timings are not assigned to the first phase.
  Therefore, for the time being, always ensure that all the vehicle detectors and all of the timings are configured on the first vehicle phase in the stream and that there are no detectors or timings on the second or subsequent phases.

- ST800-153 - The IC4 special conditioning mnemonics SCELLBRDn (see SCELL4 in the firmware) which read the raw solar cell inputs from each lamp switch card do not work on the emulator; i.e. toggling the 'solar cell input' on the status window does not affect the state of these bits, only the state of SOLBRIGHT.

- 0014813 – The controller does not support a stand-alone pedestrian controller configured on stream 0 and Linked Fixed Time on other streams, as both LFT and FVP modes attempt to use the fixed time timer for stream 0. Work-around: move the stand-alone pedestrian stream to a later stream number.

5   ST800 HARDWARE DESCRIPTIONS

5.1   SUMMARY OF HARDWARE ISSUE STATES

5.1.1   ST800 Main Processor PCB – 667/1/27023/001

5.1.1.(a)   Issue 1

ANL 00825 – Development Update

5.1.1.(b)   Issue 2

ANL 01010 – Development Update

5.1.1.(c)   Issue 3

ANL 01168 - First issue

5.1.1.(d)   Issue 4

ANL 01372 – RFC310775 – remove resistor R99. Trial sites to be modified at the same time as Mains Distribution Modules are updated.

5.1.1.(e)   Issue 5

ANL 01734 – Design Improvement

5.1.1.(f)   Issue 6

ANL 02113 – Cost Reduction

5.1.1.(g)   Issue 7

ANL 02388 – TS000309 – Use new low profile sockets as soon as possible (PLCC Socket)

5.1.1.(h)   Issue 8

ANL 04483 – SAP Problem

5.1.2   Expansion I/O PCB – 667/1/20229/001

5.1.2.(a)   Issue 1

LPRLIVER - First Issue

5.1.2.(b)   Issue 2

83/15359 – Mod strike added.

5.1.2.(c)   Issue 3

83/15402 – Resistors R11, R13, R15-20, R29, R31, R33-38 were 22 ohms, now 68 ohms.

5.1.2.(d)   Issue 4

83/17416 - Obsolete component – Capacitor 47uF (2 off) changed from 035 series to 037 series.

5.1.3   SDE/SA PCB – 667/1/20231/000

5.1.3.(a)   Issue 1

T400SDE1 – First Issue

5.1.3.(b)   Issue 2

83/15144 – Item 64 added and RP7 and RP8 deleted.

5.1.3.(c)   Issue 3

83/15284 – Items list 667/1/20200/000 item 2 deleted

5.1.3.(d)   Issue 4

83/17416 - Obsolete component – Capacitor 47uF (2 off) changed from 035 series to 037 series.

5.1.4   ST800 8 Phase Driver – Full – 667/1/27221/001

5.1.4.(a)   Issue 1

ANL 00697 - Development

5.1.4.(b)   Issue 2

ANL 00786 – First Issue

5.1.4.(c)   Issue 3

ANL 00774 – Development Update

5.1.4.(d)   Issue 4

ANL 00956 – Development Update

5.1.4.(e)   Issue 5

ANL 01503 – Production Test Update

5.1.4.(f)   Issue 6

ANL 02584 – Fuses FS1 and FS2 changed from 518/4/97020/120 to 518/4/97056/010 (10A glass to ceramic)

5.1.4.(g)   Issue 7

ANL 03539 – Change R38, R39, R43 and R73 from 1K0 to 910R as ADC reference drive circuit has insufficient current drive.

5.1.5   ST800 8 Phase Driver – No LR UK Fuse – 667/1/27221/012

5.1.5.(a)   Issue 1

ANL 00786 – First Issue

5.1.5.(b)   Issue 2

ANL 00774 – Development Update

5.1.5.(c)   Issue 3

ANL 00956 – Development Update

5.1.5.(d)   Issue 4

Not issued

5.1.5.(e)   Issue 5

Not issued

5.1.5.(f)   Issue 6

ANL 01437 – Allows export boards to be made from UK ones.

5.1.5.(g)   Issue 7

ANL 01490 – Corrected errors and allows export boards to be made from UK ones

5.1.5.(h)   Issue 8

ANL 01503 – Production Test Update

5.1.5.(i)   Issue 9

ANL 02584 – Fuses FS1 and FS2 changed from 518/4/97020/120 to 518/4/97056/010 (10A glass to ceramic)

5.1.5.(j)   Issue 10

ANL 03539 – Change R38, R39, R43 and R73 from 1K0 to 910R as ADC reference drive circuit has insufficient current drive.

5.1.5.(k)   Issue 11

ANL 04112 – Now Obsolete – use 667/1/27223/012 (This is a direct replacement)

5.1.6   ST800 8 Phase Driver – No LR Export Fuse – 667/1/27221/002

5.1.6.(a)   Issue 1

ANL 00786 – First Issue

5.1.6.(b)   Issue 2

ANL 00905 – Development Update

5.1.6.(c)   Issue 3

ANL 00956 – Development Update

5.1.6.(d)   Issue 4

ANL 01167 – Development Update

5.1.6.(e)   Issue 5

ANL 01437 – Allows export boards to be made from UK ones

5.1.6.(f)   Issue 6

Not Issued

5.1.6.(g)   Issue 7

ANL 01490 - Corrected errors allowing export boards to be made from UK ones

5.1.6.(h)   Issue 8

ANL 02127 – Issue state when converting to export version

5.1.6.(i)   Issue 9

ANL 04112 – Now Obsolete – use 667/1/27223/002 (This is a direct replacement)

5.1.7   Ancillary Processor – 667/1/21611/001

5.1.7.(a)   Issue 1

CAD-1230 – First Issue

5.1.7.(b)   Issue 2

83/17906 – Development Update

5.1.7.(c)   Issue 3

83/18073 – Development Update

5.1.7.(d)   Issue 4

83/18267 – Increase size of firmware prom

5.1.7.(e)   Issue 5

83/18637 – Any OTU with problems or high error level return for repair/update

5.1.7.(f)   Issue 6

ANL 00372 – Add items 5 & 6 – see 667/CH/21611/500

5.1.7.(g)   Issue 7

ANL 00848 – If not used for OTU it may have the modem chip missing.

5.1.7.(h)   Issue 8

ANL 01328 – Update for use of Integral OTU facility

5.1.7.(i)   Issue 9

ANL 01340 – First numeric issue of /KT/

5.1.7.(j)   Issue 10

ANL 01543 – Order Process Update

5.1.7.(k)   Issue 11

ANL – 02534 – Development Update

5.1.7.(l)   Issue 12

ANL 02667 – Kitting Process Update

5.1.7.(m) **Issue 13**

ANL 03667 – Add modem daughter card

5.1.7.(n) **Issue 14**

ANL 04009 – Correct 'unused' in parts list

5.1.7.(o) **Issue 15**

ANL 04142 – Change R118 and R120 to 560R

5.1.8 **ST800 Mains Distribution PCB – 667/1/27025/000**

5.1.8.(a) **Issue 1**

ANL 00815 – First Issue

5.1.8.(b) **Issue 2**

ANL 00839 – Development Update

5.1.8.(c) **Issue 3**

ANL 01768 – Cost reduction

5.1.8.(d) **Issue 4**

TS002341 – Change rivet for PL1 and PL2 to give more support

5.1.9 **ST800P – Processor (Pedestrian) PCB – 667/1/27023/002**

5.1.9.(a) **Issue 1**

ANL 01655 – First Issue

5.1.9.(b) **Issue 2**

ANL 02113 – Cost reduction

5.1.9.(c) **Issue 3**

ANL 02388 - TS000309 – Use new low profile sockets as soon as possible (PLCC Socket)

5.1.10 **ST800P – 4 Phase Pedestrian Driver PCB No RLM PCB 667/1/27223/402**

5.1.10.(a) **Issue 1**

ANL 01617 – First Issue

5.1.10.(b) **Issue 2**

ANL 01678 – Development Update

5.1.10.(c) **Issue 3**

ANL 01738 – Development Update

5.1.10.(d) **Issue 4**

ANL 01660 – Fitting of Blanking Plate

5.1.10.(e) Issue 5

ANL 02306 – Part update with more purchasing options

5.1.10.(f) Issue 6

ANL 02584 - Fuses FS1 and FS2 changed from 518/4/97020/120 to 518/4/97056/010 (10A glass to ceramic)

5.1.10.(g) Issue 7

ANL 02694 – New Items List to help Production when kiting

5.1.10.(h) Issue 8

ANL 03336 – Updated in-circuit test program

5.1.10.(i) Issue 9

ANL 04070 – Updated /DA/ drawing.

5.1.10.(j) Issue 10

ANL 04482 – corrected 'not fitted' list

5.1.10.(k) Issue 11

TS002350 – Change rivet type

5.1.10.(l) Issue 12

TS002985 – If FCI type connector used apply varnish between mains and logic pins

5.1.11 ST800P & ST800SE – Mains Distribution PCB – 667/1/27025/001

5.1.11.(a) Issue 1

ANL 00815 – First Issue

5.1.11.(b) Issue 2

ANL 00839 – Development update

5.1.11.(c) Issue 3

ANL 01170 – Development update

5.1.11.(d) Issue 4

ANL 01263 – Development update

5.1.11.(e) Issue 5

ANL 01768 – Cost reduction

5.1.11.(f) Issue 6

TS002349 – changed PL1 & 2 connector rivets for longer ones.

5.1.12 ST800SE – 4-Phase Export No Mon Driver PCB – 667/1/27223/403

5.1.12.(a) Issue 1

ANL 01617 – First Issue

5.1.12.(b) Issue 2

ANL 01680 – Development update

5.1.12.(c) Issue 3

ANL 01699 – Development update

5.1.12.(d) Issue 4

ANL 01738 – Development update

5.1.12.(e) Issue 5

ANL 01660 – Fitting of blanking plates

5.1.12.(f) Issue 6

ANL 02306 – Part update with more purchasing options

5.1.12.(g) Issue 7

ANL 02584 - Fuses FS1 and FS2 changed from 518/4/97020/120 to 518/4/97056/010 (10A glass to ceramic)

5.1.12.(h) Issue 8

ANL 02694 – New Items List to help Production when kiting

5.1.12.(i) Issue 9

ANL 04482 – corrected 'not fitted' list

5.1.12.(j) Issue 10

ANL 03634 – Change spacer supplier

5.1.12.(k) Issue 11

TS002350 - Change rivet type

5.1.12.(l) Issue 12

TS002985 - If FCI type connector used apply varnish between mains and logic pins

5.1.13 ST800SE – 8 Phase Exp. No Mon Driver PCB – 667/1/27223/003

5.1.13.(a) Issue 1

ANL 01617– First Issue

5.1.13.(b) Issue 2

ANL 01683 – Development update

5.1.13.(c) Issue 3

ANL 01699 – Development update

5.1.13.(d) Issue 4

ANL 1738 – Development update

5.1.13.(e) Issue 5

ANL 1660 – Fitting of blanking plates

5.1.13.(f) Issue 6

ANL 02306 – Part update with more purchasing options

5.1.13.(g) Issue 7

ANL 02584 - Fuses FS1 and FS2 changed from 518/4/97020/120 to 518/4/97056/010 (10A glass to ceramic)

5.1.13.(h) Issue 8

ANL 02697 – New Items List to help Production when kitting

5.1.13.(i) Issue 9

ANL 03539 – Change R38, R39, R43 and R73 from 1K0 to 910R as ADC reference drive circuit has insufficient current drive.

5.1.13.(j) Issue 10

TS002350 - Change rivet type

5.1.13.(k) Issue 11

TS002985 - If FCI type connector used apply varnish between mains and logic pins

5.1.14 ST800 8 Phase Driver UK Home No RLM - 667/1/27223/012

5.1.14.(a) Issue 9

ANL 04482 – 'Not fitted' list changed.

5.1.14.(b) Issue 10

TS002350 – Connector rivets changed to a more ready available type.

5.1.14.(c) Issue 11

TS002985 – Create a new part number for the Harting Connector. This connector only to be used on this PCB

5.1.15 ST800 8 Phase Driver No RLM Export - 667/1/27223/002

5.1.15.(a) Issue 1

ANL 04112 – First Issue

5.1.15.(b) Issue 2

TS002321 – Add label that the defines PCB as Export.

5.1.16 ST800 8 Phase Driver "LED Lamp Switch" UK – 667/1/33905/312

5.1.16.(a) Issue 1

First Issue

5.1.17 ST800 8 Phase Driver "LED Lamp Switch" Non-UK – 667/1/33905/302

5.1.17.(a) Issue 1

First Issue

5.1.18 ST700 Main Processor Card – 667/1/27831/xxx

The ST700 is compatible with all variants and issues of the ST700 Main Processor Card.

5.1.18.(a) Variant /001 (ST700 stand-alone pedestrian)

5.1.18.(b) Variant /003 (ST750 stand-alone pedestrian)

Variant /003 can also be used in an ST700 (in place of /001)

5.1.18.(c) Variant /006 (ST700 export intersection)

5.1.18.(d) Variant /007 (ST750 export intersection)

Variant /007 can also be used in an ST700 (in place of /006)

5.1.19 ST700 Phase Driver Card – 667/1/27833/xxx

The ST700 is compatible with all variants and issues of the ST700 Phase Driver Card.

5.1.20 ST700 LED Phase Driver Card – 667/1/33790/xxx

The firmware needs to be PB800 issue 27 or later to support the ST700 LED Phase Driver Card. See the handbook 667/HB/32921/007 issue 6 or later for more details on this.

6 HARDWARE - KNOWN PROBLEMS, RESTRICTIONS AND FUTURE ENHANCEMENTS

Ensure that fuses FS1 and FS2 changed from 518/4/97020/120 to 518/4/97056/010 (10A glass to ceramic) on Phase Driver PCBs.

The ST800P normally has its configuration loaded serial through the handset port so no configuration PROM is fitted. See 'Standalone Pedestrian Controller's Configuration Data' in the ST800 Controller Handset Handbook. As an alternative, a configuration PROM may be fitted and the controller initialised to start the controller. The PROM may then be removed for use at another site.

7   HARDWARE - COMPATIBILITY

The following documentation is essential for anyone undertaking first line maintenance on the ST800.

667/HH/27000/000	ST800/ST700 CONTROLLER HANDSET HANDBOOK
667/HB/27000/000	ST800 CONTROLLER GENERAL HANDBOOK
667/XE/27000/000	ST800 DRAWINGS
667/DJ/27000/000	ST800 FORMS HANDBOOK
667/HE/20661/000	INSTALLATION GENERAL PRINCIPLES
667/HE/20663/000	DETECTOR INFORMATION HANDBOOK
667/HE/20664/000	INSTALLATION GENERAL TESTING HANDBOOK
667/HE/20665/000	ABOVE GROUND DETECTORS
667/SD/17279/001	CABLE TEST SPECIFICATION

8 DIFFERENCES BETWEEN T400 AND ST800

For those people familiar with a Type 400 traffic controller, the following points in particular should be noted.

- The operation of the ST800's handset port has been modified slightly.

  Firstly, the handset port can operate at 1200, 9600 or 19200 baud and thus <return> must be pressed a number of times when a handset is first connected so that controller can automatically determine which baud rate is being used. All handset communications use 7 data bits and even parity. The ST800 does <u>not</u> support eight data bits, no parity.

  Secondly, the controller assumes that the handset can display up to 20 characters, thus allowing it to display more information, such as the time and the date on one line. See the ST800 Controller Handset Handbook for further details.

- Most of the facilities are very similar to those available on the T400, expanded so they can be applied to 32 phases and stages.

  One noticeable difference is CLF which now uses an explicit cycle time and the 'plan times' specify offsets within the cycle, i.e. at time 'x', rather than 'durations', i.e. for 'x' seconds, which when summed up gave the 'cycle' time.

  Also, lamp monitoring is now fully integral (note that the lamp monitoring transformers are built in to the Lamp Switch PCBs) with the controller main processor providing the facility directly.

  The ST800 includes a fault log with 64 fault log flags like that on the T400 (although the meaning of some faults have had to change) as well as an all-new historic time-stamped log which records the time and date that faults occurred and were cleared. See the ST800 Controller Handset Handbook for further details.

- The ST800 does not illuminate the signals on first time power-up, but always logs memory faults and keeps the signals switched off until these fault log entries have been cleared. This is to ensure that the controller never brings on the signals after reloading the data from the configuration PROM, since this data may need to be changed using the handset first.

- Also, to avoid losing information changed using the handset, the initialisation commands (TKE, LRN, and CNN) can only be used to initialise a controller when a new configuration PROM has been plugged in. Entering the commands without changing the configuration PROM has no effect.