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**SYSTEM:** T400 CONTROLLER

**BUSINESS:** TRAFFIC

USE OF T400  
FIRMWARE AND HARDWARE  
CONFIGURATIONS

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## 1. Introduction

This technical note details the issues and use of major assemblies, within the T400, giving brief details of the reason for change. Major assemblies covers any item or module which can be held as a spare including firmware proms, which can drastically affect the operation of the controller.

The information is provided to enable a faulty board to be replaced safely with a good one. It will also ensure that the correct board is used to provide the facilities required by the firmware. If necessary this process could be reversed, in certain instances, to enable an earlier issue board to be used with safety.

Note: The controller facilities required ( requested ) in each configuration PROM, will generally only be supported by the type of firmware for which the configuration was produced, but may also be supported by a later firmware version for the same controller (e.g. configurations for PB320 and PB321 are supported by PB322). If the configuration PROM is incompatible with the firmware (e.g. the facilities requested in the configuration are not supported by the firmware installed in the controller), then the controller will not switch on and an error will be inserted in Fault Log FLF 21

### Issue States

When changes occur the issue will always increase, however this document only details significant issue changes i.e. where the change is "significant", as defined below.

A change in issue is noted in the text in section 6 if :-

- a) There is a change in Performance and Interchangeability
- or
- b) It is required that production make to the latest issue.
- or
- c) There is some retrospective action required in production or in the field.

Any item may be used as a spare for the same item provided that the issue state is the same or higher, if the issue state is lower it may only be used if a check is carried out as to what the difference is. This means that if a controller (e.g. 50-0-50v Controller which must have at least issue 3 phase driver boards), requires a lamp switch PCB replaced, it can be replaced with any lamp switch PCB with issue 3 or higher i.e. 3, 4, 5, etc but not with issue 2 or 1, as a check would reveal that it was only from issue 3 onwards that the change was made to support 50-0-50 working. If a change occurs in an item which stops it being used as a spare then it will be given a new part number usually by changing the last three digits or if not by changing the 5 digits.

The T400 assembly and sub assemblies, are controlled in the same manner as all other Traffic equipment using issue state control.

## 2. Issue Change Details

If the firmware requirements are such that an existing board does not match the requirements detailed in section 6, then it will need to be raised in issue or a new board with a new part number used.

### 3. Summary Of Facilities Added To Firmware

(See section 6 for details)

**NB Only the latest issue of IC3 (the intersection configurator), will support the latest of these firmwares / facilities.**

#### 3.1. T400 CPU Firmware

PB322 issue 1 (NB Requires T400 CPU pcb issue 9 or Greater)

This supports those facilities in PB321 issue 8 with the following additions:-

Add support of Integral TC12 OTU/LMU.

Correct the problem which caused the handset display not to update correctly if display shortened and the same characters appeared in the same places as were in the previous longer display. E.g. previously if the display was MOD0:13 and should have then changed to MOD0:1, then with software prior to this issue, the display would not have changed.

Enhance the mode display such that when in 'Fixed Time To Current Maximum' mode, mode '1' i.e. Fixed Time is displayed, instead of mode '2' V.A.

PB322 issue 2

Add support of City of London TCSU Integral Remote Monitoring (IRM) for Pelicans only.

PB322 issue 3

Add support for City of London TCSU IRM for intersection controllers.

Note that this was subsequently updated – see issue 5

Flexible Lamp Sequencing added for TOUCAN support.

Addition of Prom Change Facility.

Enhanced RLM operation.

Upload / Download facilities added.

'New fault in log' reply bit facility.

Variable amber leaving time added.

Added software flashing ambers on green correspondence or conflict.

Increased the number of conditioning timers to 64.

PB322 issue 4

Upload / Download Facility corrected.

**FOR UPLOAD / DOWNLOAD PB322 Iss. 4 OR GREATER MUST BE USED**

PB322 issue 5

Support for City of London TCSU IRM for intersection controllers updated.

Issues 3 or 4 may not be used where intersection controller IMU required.

ENG215 Added showing phases inhibited by RLM.

EPROM change facility added.

PB322 issue 6

Time Stamp added to fault log, use FLT command.

Handset display width made adjustable, handset command WID specifies number of characters wide. Also PME=248 may be used to automatically set to 80 chars wide.

A number of other handset command changes have also been made to make its use easier, i.e. binary displays can now display 2 bytes, hex numbers less than or equal to 'F' will be displayed with leading 0, Indices are now optional i.e. typing MIN will return MINA, and all fault log operations are auto scanning e.g. enter FLT and first fault log time stamp will be found press + and the next will be found.

Manual panel operation enhanced to provide more info. Mode select LEDs flash when mode selected but unable to operate it that mode.

Stage button LEDs flash during interstages.

When manual panel is operational and normal selected, other mode lights will also illuminate in addition to normal LED, if the controller is running a mode which can be displayed on the manual panel i.e. VA, FT, or CLF.

New status command 'STS' displays the mode as text, the current stage and whether minimum or maximum greens are running, etc.

Special conditioning can now control the wait indicators directly.

New command 'DSF' indicates the detectors state on DFM failure.

### PB322 issue 7

Part Time on Stream Facility added for TCSU intersection controller contract. The modifications allow individual streams to be forced into and out of part-time mode using special conditioning, controlled by timetable events or UTC inputs etc. As a result of these changes it is now possible to restart one or more streams disabled by second red lamp failure, using the KR command, without switching the controller off and back on again. This only applies if the Part Time on Stream Facility is configured and the Red Lamp monitor fault signals (RLF1 & RLF2) are configured as unlatched. (i.e. manual reset not required to clear RLM faults).

Note that issue 7 must be used where part time on-stream required. See section 6 for details.

### PB322 issue 8

No additional facilities added

### PB322 issue 9

Correction to the handset interrupt routine to prevent buffer overflow.

### PB322 issue 10

Not Issued

### PB322 issue 11

Fix for T400 Pelicans which will allow the use of Helios LED Signals

## **3.2. Integral LMU/RLMU/OTU Firmware**

### PB392 issue 1

Beta release version of Issue 2. Not to be used, use at least issue 2.

### PB392 issue 2

Although Upload / Download facility added it should not be used for this purpose see issue 3.

Sensor sharing support for use as a RLM with TCSU RLM.

#### PB392 issue 3

Upload / Download Facility corrected

**FOR UPLOAD / DOWNLOAD PB392 Iss. 3 OR GREATER MUST BE USED**

#### PB392 issue 4

Improved display of:-

lamp failure information using KLP command.

and OTU facilities etc using, GAF/KAF (OTU facilities) and GPV/KPV (PLD type).

**ALL changes (noted) below are associated with the use of this prom in the free standing TC12 OTU.**

Added serial interface for Environmental Monitor (i.e. Environmental monitor connected to OTU handset port).

Fixed a fault which may cause error 0202 (error number is displayed on handset when first plugged in after OTU failure).

Modified to allow different operation of the handset access timeout and output override commands when used in conjunction with PLD PB 393 106 01 for **controlling VMS, via dial up modem interface to OTU handset port.**

PB392 issue 5 DRAFT ONLY NOT FORMALLY ISSUED **NOT USED**

**DRAFT ONLY NOT TO BE USED OTHER THAN IN VMS SYSTEM**

No additions affecting integral RLMU, LMU or OTU facilities

**ALL changes (noted) below are associated with the use of this prom in the free standing TC12 OTU.**

Improved operation of VMS control facility. It is recommended that OTUs used for **VMS control via dial up modem interface to OTU handset port**, are fitted with this firmware.

#### PB392 issue 6

For Use In Freestanding OTUs and Integral OTU/LMU/RLMU

##### 1) Remote Handset To 3rd Party Controllers

The free-standing TC12-OTU now includes the facility to be able to communicate to its associated controller from the UTC instation using the TC12 upload/download remote handset, in a similar way to free-standing OMU's.

##### 2) Controller Configuration PROM Changed

The integral RLM card will automatically detect when a new controller configuration PROM has been put in the controller which changes the RLM configuration. Until the

RLM card is fully reset and the new configuration accepted, the RLM card will force 2nd red lamp fail and raise a new fault log flag (KLF17).

### 3) User Friendly LMU Commands

New LMU handset commands have been added which display live information in a much more user-friendly form.

KEV displays the lamp supply voltage in volts.

KES displays the last current read by the sensor in milliamps, as well as indicating the actual phase and colour(s) the reading is for.

KEL displays the learnt load for each colour of each phase. The load is displayed in watts and thus gives an indication of the number of bulbs that are connected.

KML can be used to monitor the LMU learning the lamp loads following LMU reset. For each aspect not yet learnt, it shows the phase and colour and how learning is progressing by displaying the 'percent complete'. The display normally shows the phase and colour that the LMU is currently learning at that instant, but while the LMU is waiting for aspects to appear, the display automatically cycles round the aspects which are not yet learnt.

### 4) Fault Log Text and Optional Indices

To match PB322 issue 6, this issue of firmware also allows indices to be omitted and includes a fault log scanning command (GFS/KFS) displaying a text abbreviation of any active faults.

### 5) OTU Input's

For each input on the TC12-OTU, GIU displays what that "input's use", i.e. what facilities that input has been assigned to. For example, if input 0 is assigned to SCOOT unit 2, then GIU 0 displays 'S2'. The command will indicate which SCOOT, count, queue, occupancy or HIOCC units the input is assigned to, and whether U/D has been configured. It will also indicate if the input is configured as an LMU mains state.

### 6) Handset Echoes and Repeat Displays

The VMS+LMU version of the TC12 OTU includes a facility to switch off individual character echoes and stop repeat displays. Thus, when a command is entered, only one complete display is generated.

#### PB392 issue 7

VMS OTU mods - map output bit 0 to TC bit output.

Increase maximum upload/download message length

VMS OTU mods - add timeout on output override data including default. GDT command is now used to set this new timeout value in seconds.(255 - no timeout).

VMS OTU mods - special display formats for GCU and GDI commands 3 digit fixed length decimal with 4 digit CRC.

#### PB392 issue 8

Provision of an RS232 interface for communications with the Instation.

New handset command GPD to specify additional propagation delay in ms.

New handset command GRX to specify whether Rx data from Instation is to be controlled using CD (modem interface) or without CD (RS232 interface).  
GPD and GRX configuration items are included in the OTU upload / download data group 501.

PB392 issue 9

Fix fault which caused problem with car park signs (GOO=1 reset the outputs)

**3.3. Integral OMU (TCSU City Of London IRM) Firmware Intersection Controller**

PB581 issue 1

Initial Issue. Supersedes PB580  
Only this issue and later provides support for intersection controllers.  
Requires PB322 issue 5 or later for intersections (PB322 issue 3 or later for Pelicans).

PB581 issue 2

Changes to Lamp Supply failure reporting to support T400 Part Time on Stream Facility, and to provide additional fault codes to report streams extinguished by 2nd red lamp failures.  
Requires PB322 issue 7 or later.

PB581 issue 3

Not Released.

PB581 issue 4

Not Released.

PB581 issue 5

ST700 and ST800 support added. This IMU firmware is now also compatible with earlier T400 firmware issues.

**3.4. Integral OMU (TCSU City Of London IRM) Firmware PELICAN Controller**

PB580 issue 1

First issue No longer Used.

PB580 issue 2

Modified to meet with TCSU approval.

PB580 issue 3



Not issued as a prom, downloadable only .

PB580 issue 4

Not issued as a prom, downloadable only .

PB580 issue 5

Modified to operate with PACE FX34 modems, otherwise will not Answer or Dial out. IMU using FX32 modems may still use issue 2.

PB580 issue 6

Modified to operate with AMD version of serial comms IC 85C30 IC40, as well as than ZILOGs version. If AMD version in use on IMU pcb and this firmware is not used IMU will fail loop back test and not answer calls nor dial out.

**Note:-**

PB580 superceded on later deliveries by PB581

## FIRMWARE INSTALLATION

The choice of what firmware to install should be based upon the facilities required summarised in section 4 and the hardware compatibility described in section 6.

To complete the picture a firmware installation chart has been provided (See Tables 1 & 2).

Each firmware PROM is coded to indicate its type, position and issue state. The label will look something like this:

```

PB 320 - Type
000 06 - Prom Issue
|
Variant to
indicate position

```

Before installing any proms check:

- the boards are the correct issue
- the boards are the correct variant
- all the firmware PROMS (if more than one i.e. a set) are to be the same issue

The PROMS can now be installed using the variant number and the charts shown in below to determine in which socket the PROM should reside.

### • Table 1 - T400 Main Controller Firmware Installation Table

Firmware Code	T400 Firmware	T400 Config	T400 Conflict
	IC18	IC27	IC53
PB320	PB320 /000	DTxxx/nnn 000 (27256)	DTyyy/nnn 000 (27512)
PB321	PB321 /000	DTxxx/nnn 000 (27256)	DTyyy/nnn 000 (27512)
PB322	PB322 /000	DTxxx/nnn 000 (27256)	DTyyy/nnn 000 (27512)

/xxx and /yyy are batch numbers used by Configuration Engineers.  
/nnn = variant for the particular intersection.

**Table 2- T400 Ancillary Facilities Firmware Installation Table**

Firmware Code	Facility	PCB ID	Position
PB314	SDE/SA	667/1/20231/000	IC 13
PB392	Integral RLMU/LMU & OTU	666/1/02239/001	IC 2
PB580	TCSU Pelican only IRM	667/1/25169/000	IC 4
PB581	TCSU Pelican & Junction IRM	667/1/25169/001	IC 4

#### 4. COMPATIBILITY OF T400 CPU PCBs WITH T400 FIRMWARE

To ensure that the software functions correctly, the right board version and Issue must be used.

Traffic Intersection ONLY CPU PCB var /000 Issues	Firmware		
	PB320	PB321	PB322
1	Y	This CPU PCB cannot be used with above firmwares PB321 & PB322.	
2	Y		
3	Y		
4	Y	A new board is required, no modification available.	
No Longer used	No Longer used		

Traffic Intersection Pelican Controller CPU PCB var /001 Issues	Pelican Controller ONLY CPU PCB var /002 Issues	Firmware	
		PB321	PB322
1	1	Y	N
2	2	Y	N
3	3	Y	N
4	4	Y	N
5	5	Y	N
6	6	Y	N
7	7	Y	N
8	8	Y	N
9	9	Y	Y
10	10	Y	Y
11	11	Y	Y
12	12	Y	Y
13	12	Y	Y

#### Notes

1. A Junction controller requires the intersection CPU pcb 667/1/20221/001 and the 4 phase driver pcb 667/1/20223/000
2. A Pelican controller requires the Pelican CPU pcb 667/1/20221/002 and the two phase driver pcb 667/1/20225/000.
3. PB321 firmware can be used on issue 9 or greater CPU pcbs, but the prom must be plugged into the lower part of the firmware prom socket.
4. New facilities added on PB322 firmware e.g. Integral OTU/LMU, TCSU City of London Integral OMU, Integral U/D, obviously require PB322 firmware and therefore issue 9 upwards of CPU pcb.

• **Table 3 - Firmware and CPU Compatibility Table**

T400 CPU Firmware	CPU PCB 20221/001	CPU PCB 20221/002	Ancillary Processor Firmware (Integral OTU/LMU)	Ancillary Proc. PCB 21611/001	IMU Firmware PB580 (Pelican only) PB381	Integral Facility Processor TCSU IMU 25169/001	SDE/SA	Comments
PB 321	Issue 1 to CU	Issue 1 to CU	N/A	N/A	N/A	N/A	Issue 1 to CU	
PB 322 Issue 1	Issue 9 to CU	Issue 9 to CU	PB391	Issue 1 to 3	N/A	N/A	—” —	Old issues of T400 CPU PCB’s may be brought up to this issue by hand modification in accordance with 667/CH/20221/501. Integral OTU and / or LMU supported.
PB 322 Issue 2	—” —	—” —	—” —	—” —	PB 580 for Pelican IMU iss 1 to 4 PB 580 iss 5 required if modem is PACE FX34 PB580 iss 6 required if IMU pcb has AMD device in IC40 position	Issue 4 to CU	—” —	TCSU Pelican IMU supported. IMU pcb should be issue 4 upwards.
PB 322 Issue 3	—” —	—” —	PB392 Issue 2	Issue 4 to CU	—” —	—” —	—” —	Integral RLM Approved. For RLM use PB322 issue 3 & PB392 issue 2 or later.
PB 322 Issue 4	—” —	—” —	PB392 Issue 3 to CU	—” —	—” —	—” —	—” —	Upload / Download Added
PB 322 Issue 5,6	—” —	—” —	—” —	—” —	PB 580 iss 6 for Pelican IMU PB 581 iss 1 for Junction/Pelican IMU	—” —	—” —	TCSU Intersection IMU supported
PB322 Issue 7	—” —	—” —	Iss 6 required for pt. time on-stream	—” —	PB581 issue 2	—” —	—” —	IMU - Additional support for T400 part time on-stream. PB322 iss 7 + required for PB581 issue 2
PB322 Issue 8	—” —	—” —	—” —	—” —	—” —	—” —	—” —	PB322 fix for long manual panel cables
PB322 Issue 9	—” —	—” —	—” —	—” —	—” —	—” —	—” —	Fix to allow PB322 to work correctly with a 5U OMU
PB322 Issue 10	-	-	-	-	-	-	-	Not Issued
PB322	—” —	—” —	—” —	—” —	—” —	—” —	—” —	Fix for T400 Pelicans which will allow

Issue 11								operation with Helios LED Signals
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Note : PB322 is fully backwards compatible with PB321 and hence, can be used instead of PB321.

**Always check details in section 6 to ensure that you are using the correct issues of assemblies.**

## 5. PELICAN / PUFFIN / TOUCAN PROMS

This section is arranged with the latest issue items, which should be used for all new/future orders, upgrades etc, at the bottom of the lists (i.e. last).

The following configuration PROM's are available. Each configuration must only be used with the firmware specified.

Early single pelicans used CPU PCB /000 variant using PB320 firmware. Later pelicans and dual pelicans use CPU PCB /002 variant using PB321 firmware. ( NOTE CPU PCB /001 variant with PB321 firmware will work with pelican configurations but this board is intended for intersection use.)

### PB320

667/1/16040/000 Standard MCE0125 Single Pelican Configuration and Conflict  
667/1/16041/000 PROM's.

667/1/16040/001 MCE0125 Single Pelican Configuration and Conflict PROM's with  
667/1/16041/001 dual level audibles and RTC time Sync (12:00)

667/1/16042/000 Standard MCE0145 Configuration and Conflict  
667/1/16043/000 PROM's.

The above are no longer standard

### PB321 or PB322

667/1/16048/000 **DUAL PED MCE0145** Configuration and Conflict  
667/1/16049/000 PROM's. (Issue 3)

667/1/16050/000 **SINGLE PED MCE0145** Configuration and Conflict  
667/1/16051/000 PROM's. (Issue 3)

667/1/16052/000 **SINGLE PELICAN MCE0125 - ENH DFM** Configuration and  
667/1/16053/000 Conflict PROM's. (Issue 2)

667/1/16054/000 **DUAL PELICAN MCE0125 + ENH DFM** Configuration  
667/1/16055/000 and Conflict PROMS. **For City of London TCSU ONLY.** (Issue 2)

667/1/16056/000 **DUAL PELICAN MCE0125** Configuration and Conflict  
667/1/16057/000 PROM's see section for details. (Issue 4)

667/1/16058/000 **STANDARD SINGLE PELICAN MCE0125** Configuration  
667/1/16059/000 and Conflict PROM's see section for details. (Issue 2)

667/1/16060/000 **SINGLE PUFFIN SPEC V2.1** Configuration  
667/1/16061/000 and Conflict PROM's see section for details. (Issue 4)

667/1/16062/000 **DUAL PUFFIN SPEC V2.1** Configuration and  
667/1/16063/000 Conflict PROM's. (Issue 4)

667/1/16076/000 **SINGLE PUFFIN SPEC V2.2** Configuration and  
667/1/16077/000 Conflict PROM's. (Issue 4)

667/1/16078/200 **SINGLE PELICAN (MCE0125)** Configuration and  
667/1/16079/200 Conflict PROM's. (Issue 2)

667/1/16092/000 **KENT SINGLE PUFFIN** Configuration and Conflict  
667/1/16093/000 PROMS (Issue 1)

667/1/16094/000 **KENT DUAL PUFFIN** Configuration and Conflict  
667/1/16095/000 PROMS (Issue 1)

667/1/16100/000 **SINGLE (Nearside Signal) TOUCAN** Configuration and Conflict  
667/1/16101/000 PROMS (Issue 1)

667/1/16112/000 **DUAL PUFFIN (WITH SDE/SA)** Configuration and conflict proms  
667/1/16113/000 (Issue 1)

667/1/16118/000 **DUAL PUFFIN (WITHOUT SDE/SA)** Configuration and conflict  
667/1/16119/000 proms. (Issue 1)

667/1/16108/000 **DUAL (Nearside Signal) TOUCAN (WITH SDE/SA)** Configuration  
667/1/16109/000 and Conflict PROMS (Issue 1)

667/1/16114/000 **DUAL (Nearside Signal) TOUCAN (WITHOUT SDE/SA)**  
667/1/16115/000 Configuration and Conflict PROMS (Issue 1)

### PB322 Specific

667/1/16064/000 **SINGLE PELICAN MCE0125** Configuration and conflict  
667/1/16065/000 PROM's. see section for details.  
**For City of London TCSU ONLY.** (Issue 2)

667/1/16066/000 **DUAL PELICAN MCE0125** Configuration and Conflict  
667/1/16067/000 PROM's see section for details.  
**For City of London TCSU ONLY.** (Issue 2)

667/1/16068/000 **SINGLE PELICAN MCE0145** Configuration and Conflict  
667/1/16069/000 PROM's. **For City of London TCSU ONLY.** (Issue 2)

667/1/16070/000 **DUAL PELICAN MCE0145** Configuration and Conflict  
667/1/16071/000 PROM's. **For City of London TCSU ONLY.** (obsolete)

667/1/16072/000 **SINGLE PUFFIN + TCSU OMU** Configuration and  
667/1/16073/000 Conflict PROMS. **For City of London TCSU ONLY.** (obsolete)

667/1/16074/000 **DUAL PUFFIN + TCSU OMU** Configuration and Conflict  
667/1/16075/000 PROMS. **For City of London TCSU ONLY.** (obsolete)

### **NB Far Side Signalled TOUCANS require at least PB322 Issue 3**

667/1/16102/000 **SINGLE TOUCAN FAR SIDE SIGNALS** Configuration  
667/1/16103/000 and Conflict PROMS (Issue 1)



- 667/1/16110/000 **DUAL TOUCAN FAR SIDE SIGNALS (WITH SDE/SA)**  
667/1/16111/000 Configuration and Conflict PROMS. (Issue 1)
- 667/1/16116/000 **DUAL TOUCAN FAR SIDE SIGNALS (WITHOUT SDE/SA)**  
667/1/16117/000 Configuration and Conflict PROMS. (Issue 1) Requires PB322 is 4 or later
- 667/1/16120/000 **DUAL TOUCAN FAR SIDE SIGNALS for Kent**  
667/1/16121/000 Configuration and Conflict PROMS. (Issue 1) Requires PB322 is 4 or later
- 667/1/16122/000 **SINGLE TOUCAN FAR SIDE SIGNALS for Kent**  
667/1/16123/000 Configuration and Conflict PROMS. (Issue 1) Requires PB322 is 4 or later
- 667/1/16126/000 **SINGLE TOUCAN NEAR SIDE SIGNALS for TCSU (IMU)**  
667/1/16127/000 Configuration and Conflict PROMS. (Issue 1) Requires PB322 is 4 or later
- 667/1/16128/000 **SINGLE TOUCAN FAR SIDE SIGNALS for TCSU (IMU)**  
667/1/16129/000 Configuration and Conflict PROMS. (Issue 1) Requires PB322 is 4 or later
- 667/1/16130/000 **DUAL TOUCAN NEAR SIDE SIGNALS W/SDE for TCSU**  
667/1/16131/000 Configuration and Conflict PROMS. (Issue 1) Requires PB322 is 4 or later
- 667/1/16132/000 **DUAL TOUCAN FAR SIDE SIGNALS W/SDE for TCSU**  
667/1/16133/000 Configuration and Conflict PROMS. (Issue 1) Requires PB322 is 4 or later
- 667/1/16134/000 **DUAL TOUCAN NEAR SIDE SIGNALS No SDE for TCSU**  
667/1/16135/000 Configuration and Conflict PROMS. (Issue 1) Requires PB322 is 4 or later
- 667/1/16136/000 **DUAL TOUCAN FAR SIDE SIGNALS + IMU, No SDE**  
667/1/16137/000 Configuration and Conflict PROMS. (Issue 1) Requires PB322 is 4 or later
- 667/1/16138/000 **SINGLE PUFFIN for TCSU**  
667/1/16139/000 Configuration and Conflict PROMS. (Issue 1) Requires PB322 is 4 or later
- 667/1/16140/000 **DUAL PUFFIN for TCSU. No SDE**  
667/1/16141/000 Configuration and Conflict PROMS. (Issue 1) Requires PB322 is 4 or later
- 667/1/16142/000 **DUAL PUFFIN WITH SDE for TCSU**  
667/1/16143/000 Configuration and Conflict PROMS. (Issue 1) Requires PB322 is 4 or later

**6. INDIVIDUAL ASSEMBLY ISSUE CHANGE DETAILS**

In the following text under the column headed Change required will be either blank or a letter and these will have the following meaning.

Blank Change is not mandatory and not retrospective.

A = Not mandatory but required to provide specific additional facilities.

F = To be changed / updated if fault which is cured by the update exhibits itself, or if item is faulty and sent for repair (regardless of what caused fault).

SM = Safety Mandatory.

M = Mandatory required to comply to specification.

CM = Customer Mandatory; this will generally indicate that the update was requested by or for a particular customer (customers name will be noted in the attendant text) and that where requested by that customer, equipments should be updated.

**6.1. T400 Firmware and PLDs**

Change Required

- 667/1/12314/000 Programmed Prom for SDE/SA
  - SM Iss 2 (83/15255)
    - Change to make SDE work correctly to DTp spec and provide a full extension when the Soundmark test set is unplugged.
  - Iss 3 (83/17778)
    - No effect on operation
  
- 667/1/12315/100 PLD for 667/1/20221/001
  - Integrated circuit - Programmable device
  - Iss 2 (83/15721)
    - Change to program to allow plastic devices.
  - Iss 3 (ANL01636) Original PLD now obsolete: Change to AMD/Vantis chip
  
- 667/1/12315/101 PLD for 667/1/20221/002
  - Integrated circuit - Programmable device
  - Iss 2 (83/15721)
    - Change to program to allow plastic devices.
  - Iss 3 (ANL01636) Original PLD now obsolete: Change to AMD/Vantis chip.
  
- 667/1/12320/000 PB320 Firmware PROM
  - Iss 1 Initial release.
  - Iss 2 Raised in issue for administrative reasons when mod state control introduced.
    - No retrospective change required.
  
- 667/1/12321/000 PB321 Firmware PROM
  - Iss 2 (83/15768)
    - This issue provided for TCSU orders see section 4 PB321 iss. 2.
  - CM Iss 3 (83/15946)
    - This issue created for Hong Kong. All other orders except TCSU may use Issue 1, TCSU to use Issue 2.
  - CM Iss 4 (83/15988)

- F Iss 5 (83/16023) This issue created to correct the failure mode. All future deliveries to be Iss 4.  
This issue corrects a fault on Iss 4 and Iss 3 mandatory change if controller fails the following test. Switch controller to manual then back to V.A. using handset check that demands have been entered for all real phases, if not check to see if there is a special reason why not, and if no special reason replace firmware.
- CM Iss 6 (83/16680) This issue was created to do the following:-  
a) Change/correct phase delay operation with RLMU.  
CM b) Correct manual step on sequence operation (export only).  
F c) Correct problem with Pelican configs running CLF in conjunction with UTC control. Where when the UTC ped inhibit is lifted, the pelican may fallback to CLF, and if CLF is running the ped inhibit period the ped phase may not be served causing UTC plan compliance or similar fault.  
CM d) Added handset operated signal lamp test facility for TCSU (London).
- Iss 7 (83/17044) This issue was created to do the following:-  
A a) Add PUFFIN sequence. All Puffins require at least this issue.  
F b) Correct wait indicator control from special conditioning i.e. make conditioning mnemonic (1NOWAIT\* On configurator) operate as originally specified.
- Iss 8 (83/17149) This issue was created to do the following:-  
a) Increase response speed to Second Red lamp fault input, to allow future compliance of RLM facility, with requirements of TR0141B, when used with new RLMU.  
NB This means that the second RLMU input cannot be simulated using the controller DET handset command, and the input must be linked to perform simulations.
- F b) Correct a problem on parallel stage streaming with more than one stream configured, where under manual control 'Awaiting New Command' LED could illuminate during the transition between current stages and requested stages if going via alternative stages. Now only illuminates when in final target stages and minimum greens expired.
- CM c) Add EXPORT ONLY step test facility

## 667/1/12322/000 PB322 Firmware PROM

- A Iss 1 Initial release, provides for the following:-  
Required where any of facilities below are used.  
1) TC12 Integral OTU facility  
(Approval for use in the U.K. not yet sought).  
2) Integral Lamp Monitor (uses Integral TC12 OTU pcb), (Approval for use in the U.K. not yet sought).  
3) Integral U/D facility.
- CM Iss 2 1) TCSU City of London Integral OMU facility
- Iss 3 (83/18407)

Added support for initial City of London TCSU Integral Monitoring Unit requirements (IMU) – note that the requirements subsequently changed – see issue 6.

Flexible Lamp Sequencing added for TOUCAN support.

Added TC12 Upload/Download support.

Addition of Prom Change Facility.

Enhanced RLM operation.

Added support for sharing current sensors when integral IMU and RLM both fitted.

Added a 'New fault in log' reply bit facility.

Added support to allow variable amber leaving times

Added software flashing amber's on green correspondence or conflict

Increased the number of conditioning timers to 64

Iss 4 (83/18430)

Upload / Download Facility corrected.

All T400's for use with TC12 Upload / Download must be fitted with Issue 4 or later, this includes all retrospective upgrades.

Iss 5 (83/18633)

CM

Update to the later requirements of TCSU IMU on an intersection controller. (The initial version of the IMU facilities does not meet TCSU's latest requirements).

SM

Fault T400-131 has been raised and identifies that the T400 cannot inhibit PED. phases in the start-up stage on a 2nd red lamp failure. Therefore if INTEGRAL/ENHANCED RLM is configured, the start-up sequence has been modified to allow the firmware to inhibit the PED phases on start-up sequence for PED phase for export may be effected - UK sequence is unaffected.

Interface improved (fault T400-130) to simplify operation under certain fault conditions.

Fault T400-129 fixed - FLD63 was incorrectly cleared on power-up before the fix.

ENG215 now shows the phases inhibited by RLM.

Iss 6 (ANL0013)

AF

Enhanced DFM times handset range limit now allows DFM to be disabled using 255 without the upper limit needing to be set to 255.

Special conditioning can now control the wait indicators directly.

New command 'DSF' indicates the detectors state on DFM failure.

Text abbreviations added to the 'FFS' display.

'BAS=3' added which displays 16 binary bits at a time.

New status command 'STS' displays the mode as text, the current stage and whether minimum or maximum greens are running, etc.

The manual panel has been improved:

The 'next stage' LED flashes once a second during the inter-green rather than illuminating steady.

If the 'normal' button is pressed, and the controller is running one of the modes labelled on the manual panel, then both the 'normal' and the appropriate mode LED's are illuminated, indicating 'Normal VA' for example.

If the selected mode is not running, the mode LED flashes rapidly to inform the user. Thus, rather than simply illuminating to show the selection, if the user selects manual mode when it is disabled, the manual mode LED flashes.

The 'prohibited move' LED is no longer left illuminated after an illegal move is attempted. It is extinguished after 3 seconds.

The new command 'FLT' displays the time and week number that each fault log entry was last set.

The 'single-step' test mode can now be used on any T400, as long as the lights are switched off via the manual panel.

Special conditioning can now call up a CLF plan in the same way as the handset commands 'CPL' and 'CCP'.

All handset indices may now be omitted to simplify the user interface.

The handset display width has been increased to 80 characters.

Support added to allow the ancillary processor to detect changes in its default configuration held in the T400 configuration EPROM.

Fixed faults

- T400-90; Hexadecimal displays no longer drop leading zeroes.
- T400-137; The SWS handset command has been corrected
- T400-157; Multi-stream T400's may occasionally lose all the force bits on a particular stream for 200ms and thus revert back to VA (or other higher priority mode).

- |    |   |
|----|---|
| A  | Iss 7 (ANL00749)<br>Part Time on Stream Facility added for TCSU intersection controller contract. The modifications allow individual streams to be forced into and out of part-time mode using special conditioning, controlled by timetable events or UTC inputs etc. PB581 issue 2 or later required.   |
| F  | Various faults and changes related to the Part Time on Stream modifications (T400-164 to T400-167, T400-170, T400-171, T400-173, T400-174 & T400-181). Refer to the fault reports for further information.<br>T400-172: MOD command changed so that an index value is required.(for OMU)<br>T400-182: UTC input bit processing changed to correct problems where more than one force bit is active. |
| A  | Iss 8 (ANL00887)<br>T400-183: Modification to allow longer manual panel cable to be used.   |
| SM | Iss 9 (ANL03086)<br>Must be fitted to all T400's running PB322 and fitted with a 5U OMU.  |
|    | Iss 10 Not Issued   |
| M  | Iss 11 (ANL03268) Fix for T400 Pelicans which will prevent spurious RLM faults to be logged when using the controller with Helios LED Signals.  |

#### 667/1/12580/000 PB580 TCSU City Of London Pelican IMU Firmware PROM

- |       |  |
|-------|--|
| Iss 1 | First issue<br>No longer Used.                     |
| Iss 2 | (83/18191)<br>Modified to meet with TCSU approval. |

- Iss 3 (83/18493)  
Not issued as a prom, downloadable only .
- Iss 4 (Not Issued)  
Not issued as a prom, downloadable only .
- Iss 5 (83/18497)  
Modified to operate with PACE FX34 modems, otherwise will not Answer or Dial out. IMU using FX32 modems may still use issue 2.
- Iss 6 (83/18501)  
Modified to operate with AMD version of serial comms IC 85C30 IC40, as well as than ZILOGs version. If AMD version in use on IMU pcb and this firmware is not used IMU will fail loop back test and not answer calls nor dial out.

#### 667/1/12581/000 PB581 TCSU City Of London Intersection IMU Firmware PROM

- Iss 1 First Issue.  
Supersedes PB580. Provides support for intersection controllers  
  
PB581 issue 1 is interchangeable with all previous issues of PB580 except PB580 issue 1 unless intersection controller support is required.
- Iss 2 (ANL00749)  
Additional support for T400 Part Time on Stream Facility. This IMU firmware issue is compatible with T400 firmware PB322 issue 7 or later
- Iss 3 Not issued
- Iss 4 Not issued
- Iss 5 (ANL02589)  
Firmware to be used on ST800/ST700 as well as T400
- Iss 6 (ANL02609)  
Firmware issue 5 only to be used on ST800/ST700 as well as T400.

### 6.2. **MCE0125 PELICAN configurations**

#### 667/1/16040/000 Programmed Prom for Single MCE125 Pelican

- M Iss 1 First issue of single MCE125 for PB320 firmware.
- Iss 2 (83/15329)  
Mandatory change, error on detector inputs corrected .  
NO LONGER USED SEE PROM 667/1/16058.
- Iss 3 (83/17517)  
No effect on operation.

#### 667/1/16044/000 Programmed Prom for Dual MCE125 Pelican

- F Iss 1 First issue of dual MCE125 for PB321 firmware.
- Iss 2 (83/16083)  
To be changed to this issue if problems experienced with:-  
1. Call/Cancel demands being ignored if present when controller first started up.

F 2. Pedestrian phase apparently being served outside of required UTC window, if due to inhibit release window on pelican being long as it WAS 5 secs NOW reduced to 2 secs on this issue.

NO LONGER USED SEE PROM 667/1/16056.

Iss 3 (83/17517)

No effect on operation.

667/1/16046/000 Programmed Prom for Single MCE125 Pelican

Iss 1 First issue of single MCE125 for PB321 firmware.

Iss 2 (83/16083)

To be changed to this issue if problems experienced with:-

F 1. Call/Cancel demands being ignored if present when controller first started up.

F 2. Pedestrian phase apparently being served outside of required UTC window, if due to inhibit release window on pelican being long as it WAS 5 secs NOW reduced to 2 secs on this issue.

NO LONGER USED SEE 667/1/16058/000.

Iss 3 (83/17517)

No effect on operation.

667/1/16052/000 Programmed Prom for Single MCE125 Pelican

Iss 1 First issue of single MCE125 for PB321 firmware, with added enhanced DFM

NO LONGER USED SEE 667/1/16058/000.

Iss 2 (83/17517)

No effect on operation.

667/1/16056/000 Programmed Prom for Dual MCE125 Pelican

Iss 1 First issue of dual MCE125 for PB321 firmware, with added enhanced DFM and UTC bits FM & FC (UTC CLF disable & UTC CLF disable confirm respectively).

Iss 2 (83/17324)

No effect on operation.

Iss 3 (83/17517)

No effect on operation.

Iss 4 (ANL01108)

Demand for the opposing Pelican stream can be automatically generated a predetermined period after the start of Ped green

667/1/16058/000 Programmed Prom for Single MCE125 Pelican

Iss 1 First issue of single MCE125 for PB321 firmware, with enhanced DFM and added UTC bits FM & FC UTC CLF disable and UTC CLF disable confirm respectively.

Iss 2 (83/17517)

No effect on operation.

667/1/16064/000 Programmed prom for SINGLE MCE0125 PELICAN for City of London TCSU ONLY.

CM            Iss 1    First Issue of prom which requires PB322 firmware and supports City of London TCSU Integral OMU.  
                  Iss 2    (83/18072)  
                  No effect on operation

667/1/16066/000 Programmed prom for DUAL MCE0125 PELICAN for City of London TCSU ONLY.

CM            Iss 1    First Issue of prom which requires PB322 firmware and supports City of London TCSU Integral OMU.  
                  Iss 2    (83/18072)  
                  No effect on operation.

### **6.3. MCE0145 PEDESTRIAN configurations**

667/1/16042/000 Programmed Prom for Single MCE145 Pedestrian

M            Iss 2    (83/15329)  
                  Error on detector inputs corrected and link fail time reduced to 1 minute as requested by DTp.  
                  NO LONGER USED SEE 667/1/16050/000  
                  Iss 3    (83/17517)  
                  No effect on operation.

667/1/16048/000 Programmed Prom for Dual MCE145 Pedestrian

                  Iss 2    First issue MCE145 controller for use with PB321 upwards firmware, with standard DFM.  
                  Iss 3    (83/17517)  
                  No effect on operation.

667/1/16050/000 Programmed Prom for Single MCE145 Pedestrian

                  Iss 2    First issue MCE145 controller for use with PB321 upwards firmware, with standard DFM.  
                  Iss 3    (83/17517)  
                  No effect on operation.

667/1/16068/000 Programmed prom for SINGLE MCE0145 pedestrian controller for City of London TCSU ONLY.

CM            Iss 1    First Issue of prom which requires PB322 firmware and supports City of London TCSU Integral OMU.  
                  Iss 2    (83/18072)  
                  No effect on operation.

667/1/16070/000 Programmed prom for DUAL MCE0145 pedestrian controller for City of London TCSU ONLY.  
                  Not issued.

### **6.4. PUFFIN configurations**

667/1/16060/000 Programmed Prom for single PUFFIN controller



- Iss 1 First issue to PUFFIN spec version 2.1
- Iss 2 (83/17038)  
Config and Conflict PROMs increased for both single and dual Puffins. All T400 Puffin Conflict / Config. PROMs must be issue 2 or later.
- Iss 3 (83/17056)  
Audible driver output during Pedestrian Green added.  
PUFFIN CONFIG AND CONFLICT PROMS TO BE ISSUE 3 OR LATER.
- Iss 4 (83/17517)  
No effect on operation.

## 667/1/16062/000 Programmed Prom for dual PUFFIN controller

- Iss 1 First issue to PUFFIN spec version 2.1
- Iss 2 (83/17038)  
Config and Conflict PROMs increased for both single and dual Puffins. All T400 Puffin Conflict / Config. PROMs must be issue 2 or later.
- Iss 3 (83/17174)  
Audible driver output during Pedestrian Green added.  
PUFFIN CONFIG AND CONFLICT PROMS TO BE ISSUE 3 OR LATER.
- Iss 4 (83/17517)  
No effect on operation

## 667/1/16076/000 Programmed Prom for single PUFFIN controller

- Iss 2 Initial Release No longer used.

- A Iss 3 First issue to PUFFIN spec version 2.2.
- Iss 4 (ANL00539) Change of PROM type.

## 667/1/16112/000 Programmed Prom for Dual Puffin Controller

- Iss 1 First issue.  
For PB322 onwards. To version 2.2 of Highways Agency Puffin Specification. Derived from single Puffin 667/1/16076/000

**6.5. PCBs**

## 667/1/20221/000 Main Processor PCB - T400

Iss 4 (83/15542)

/000 variant no longer used. Replaced by /001 and /002 (see below). Variant /000 may be used with PB320 firmware on intersection controllers until /000 stocks exhausted.

## 667/1/20221/001 Main Processor PCB - T400 Intersection (or Pelican).

Iss 13 (ANL01838)

No effect on operation.

## 667/1/20221/002 Main Processor PCB - T400 Pelican only.

Iss 1 (83/15542)

/000 variant no longer used.

PB321 MUST use /001 or /002 Variants. Pelicans should use /002 variant, but may use /001. Intersection controllers MUST use /001.

Iss 3 (83/15929)

F Additional series diode in battery circuit added to improve battery reverse isolation voltage (as result of safety review). Reduction in value of current sink resistor pack in manual panel drive required as a result of higher capacitance in currently supplied manual panels. Manual panel buttons may not work. Boards should be up issued if problems with manual panel occur. Use modification drawing 667/CH/20221/500 to raise earlier issues to this issue.

Iss 4 (83/16739)

CM Variable capacitor added to allow clock crystal to be trimmed. Allows tuning out of initial crystal frequency errors to obtain more accurate clock time. Special crystal frequency monitoring tool required for accurate tuning, this is only a necessity on some export orders.

Iss 9 (83/17518)

A PCB modified to accommodate new PB322 firmware, (bigger firmware PROM and additional RAM). Old issue PCBs may be brought up to this issue by hand modification in accordance with 667/CH/20221/501.

Iss 10 (83/17562)

A PCB artwork modified to incorporate issue 9 changes. PCBs no longer need modification.

Iss 11 (83/18074) Label added - no effect on operation

Iss 12 (ANL01604) Pitch of legs on capacitor changed - no effect on operation.

## 667/1/20221/101 Main Processor &amp; Eprom Change Facility Assy-(T400)

Issue 1 First issue

## 667/1/20223/000 4 Phase Driver PCB

Iss 7 (83/18312) All previous issues still valid with full compatibility. Issues changed for component availability or manufacturing reasons.

- 667/1/20223/100 4 Phase Driver PCB 50-0-50 volt version
- M            Iss 3    (83/15981)  
Resistors across snubbers reduced to 150k to provide the same bleed current as on a 240 volt supply. This compensates for cable capacitance which might otherwise cause a green conflict to be seen should a phase loose all green lamp loads at once e.g. a single aspect green arrow suffering a lamp failure might otherwise cause a green conflict to be detected.
- Iss 4    (83/16118) Snubbers changed to long lead type. No effect on operation
- Iss 5    (83/17191) Obsolete capacitor replaced. No effect on operation.
- Iss 6    (83/17241) Obsolete capacitor replaced. No effect on operation
- Iss 7    (83/18312) Obsolete snubber replaced. No effect on operation
- 667/1/20225/000 2 Phase Driver/Red Lamp Monitor PCB
- Issue 10    (ANL01498)  
All previous issues still valid with full compatibility. Issues changed for component availability or manufacturing reasons.
- 667/1/20225/100 2 Phase Driver/Red Lamp Monitor PCB 50-0-50 volt version
- M            Iss 3    (83/15858)  
Change of pot to 1k to increase adjustment range of the red lamp monitor threshold.
- M            Iss 4    (83/15981)  
Resistors across snubbers reduced to 150k to compensate for possible extra cable capacitance in 50-0 50 volt system.
- Iss 5    (83/16118) Snubbers changed to long lead type. No effect on operation  
No effect on operation
- Iss 6    (83/17191) Obsolete capacitor replaced. No effect on operation.  
No effect on operation
- Iss 7    No issue 7 issued
- Iss 8    (83/17241) Obsolete capacitor replaced. No effect on operation
- Iss 9    (83/18312) Obsolete snubber replaced. No effect on operation
- Iss 10    (ANL01498) New transformer - no effect on operation.
- 667/1/20229/000 Expansion I/O PCB
- M            Iss 2    (83/15144) Resistor value changes.
- Iss 3    (83/17416)  
No effect on operation
- 667/1/20229/001 Expansion I/O PCB for Liverpool
- CM            Iss 3    (83/15402)  
Protection resistor changed from 22 to 68 ohms, to improve protection whilst still complying with Liverpool requirements.
- Iss 4    (83/17416)  
No effect on operation
- 667/1/20231/000 SDE/SA PCB Assembly
- Iss 3    (83/15284)

SM		Change to make SDE work correctly to DTp spec and provide a full extension when the Soundmark test set is unplugged.
	Iss 4	(83/17416) No effect on operation
	667/1/25169/001 TCSU IMU pcb	
	Iss 1	First issue.
M	Iss 2	(83/17910) Components R15, 71 & 95 missing from issue 1 build, but are required.
M	Iss 3	(83.17968) LMU Input Protection diodes to be disconnected from the ground plane to prevent problems with errors in the readings on LMU inputs due to the loading these diodes present. Diodes D6 to 9, 15 to 22, 31 to 34 and 47 to 50.
M	Iss 4	(83/18161) Resistor values corrected and circuitry involving ICs 35, 39 and 44 modified.
	Iss 5	(83/18170) Components C23 and R164 deleted.
	Iss 6	(83/18428) Capacitors C44 and C51 types changed.
	Iss 7	No issue 7
	Iss 8	(ANL00507) Fuse designation swapped. No effect on operation
	Iss 9	(ANL01737) PROM kit removed - now called up on 667/1/22380/002 (top level shopping list).
	Iss 10	(ANL02511) No effect on operation.
	667/1/21611/001 Integral RLMU / LMU / OTU pcb	
	Iss 1	First issue.
M	Iss 2	(83/17906) Items to be present on board corrected.
M	Iss 3	(83.18073) Insulator pad to be fitted under XL2 not XL1, only production affected.
A	Iss 4	(83/18267) Larger firmware sockets fitted to accept PB392 firmware (Required for Integral RLM and UTC Upload Download, See firmware section for full details of PB392 facilities).
	Iss 5	(83/18637)

- F Replace any Toshiba parts in IC33 position with OKI device (82C51 UART). The Toshiba part may occasionally cause corruption of the first byte of the control message i.e. the SYNCH byte. This will result in the OTU failing to reply (which will be seen as a high number of TX errors at the instation), and when examining the transmission error counts at the OTU (handset command GCT), GCT3 Sync errors and GCT5 Sync byte corrupt errors, will have increasing counts of errors.
- M Iss 6 (ANL00372) Line transformers removed from pcb I/L - to be called up as reqd.  
Addition of 68pF capacitor required on all installed pcbs
- Iss 7 (ANL00848) Removal of modem chip from I/L. Now called up where required on Works Order
- Iss 8 (ANL01328) Line transformers restored to I/L
- Iss 9 (ANL01340) Add test control document to items list
- A Iss 10 (ANL01543) Now BABT approved (for use in UK as integral OTU). BABT label added to I/L. No effect on operation of installed equipment. Note that although BABT approved and safety tested to BABT requirements the modem chip is only called up as required on a Works Order basis, so it will only function as an OTU where ordered with the modem chip.
- Iss 11 (ANL02534) No effect on operation.
- Iss 12 (ANL02667) No effect on operation.
- Iss 13 (ANL02843) Make item Obsolete – use /100 variant

#### 667/1/21611/100 Ancillary Processor PCB

- Iss 1 (ANL02389) Permit use of a Modem in place of modem chip which is unobtainable.
- Iss 2 (ANL02667) No effect on operation
- Iss 3 (ANL02690) No effect on operation
- Iss 4 (ANL02843) To supply /100 whenever the /001 variant is ordered. (Modem chip no longer available. The daughter board version is compatible for use as a red Lamp Monitor option for the integral OTU)
- Iss 5 (ANL02925) No effect on operation

### 6.6. General Hardware

#### 667/1/15150/400 Large Outercase

- Iss 2 (83/15307)

- A Additional termination panel holes in the outercase were moved to allow space for L.M.U. If both of the above are not fitted then use Iss 1.
- Iss 3 (83/15575)
- CM Stool mounting bolts stiffening plates added. D screw locks altered to conform to GEC type. Iss 3 must be implemented on TCSU other customers may use Iss 2.
- Iss 4 (83/15641)  
Paint finish changed from Epoxy to Acrylic
- Iss 5 (83/15801)
- F Screw locks to be modified to M6 welded nuts with lead in on the screws. This is an interim change until they can be changed on new production to M10
- Iss 7 (83/16417)  
Cabinet modified to have new SIEMENS logo fitted.
- Iss 8 (83/16722)
- A Plastic document changed to metal document pocket, and the door is modified to fit the metal pocket.
- Iss 9 (83/17655)  
No effect on operation
- Iss 10 (83/18188)  
No effect on operation

## 667/1/20240/000 T400 Large Preliminary assembly

- Iss 5 (83/15416)  
Change for danger labels to be added to the outercase doors, earlier issues may be used.
- Iss 7 (83/15953)
- A Covers two OMUs in one housing.
- Iss 8 (83/17509)  
Rating label moved from outercase assembly to this assembly to ensure that it is fitted.
- Iss 9 (83/18485)

## 667/1/20240/100 T400 Small Preliminary assembly

- Iss 6 (83/15416)  
Change for danger labels to be added to the outercase doors, earlier issues may be used.
- Iss 8 (83/16033)  
Modifications to conform to Electricity at Work Act. Only new controllers produced to this standard.
- Iss 10 (83/17509)  
Rating label moved from outercase assembly to this assembly to ensure that it is fitted.
- Iss 11 (83/18485)

## 667/1/20241/006 Dual Level Audio Single Pelican

- Iss 2 (83/15569)
- M Mandatory on any Single Pelican using dual level Audio this cable must be used.

- Iss 3 (83/16202)  
No effect on operation
- Iss 4 (83/17560)  
No effect on operation

## 667/1/20241/007 Dual Level Audio Dual Pelican

- M Iss 2 (83/15569)  
Mandatory on any Dual Pelican using dual level Audio this cable must be used.
- Iss 3 (83/15727)  
No effect on operation
- Iss 4 (83/16202)  
No effect on operation
- Iss 5 (83/17560)  
No effect on operation

## 667/1/20244/000 OTU supply kit

- Iss 2 (83/15466)  
Wire size change and additional terminal blocks added to make kit easier to use.
- Iss 3 (83/16033)  
Modifications to conform to Electricity at Work Act. Only new controllers produced to this standard.
- Iss 4 (83/16202)  
No effect on operation
- Iss 5 (83/16289)  
No effect on operation
- Iss 6 (83/16937)  
No effect on operation

## 667/1/20246/000 Heavy duty current kit T400L/S

- A Iss 2 (83/15486)  
Mandatory change to increase the wire size to work with controller loads over 13 amps.
- M,CM Iss 3 (83/15730)  
Labels added to describe the functions of the switches and fuses on the master and controller fuse panels. Labels must be fitted on any controllers shipped after 1/9/90, any requested by customers and any that have the new labels fitted on the basic assemblies.
- Iss 4 (83/16202)  
No effect on operation

## 667/1/20251/000 Small Outer Case

- CM Iss 3 (83/15575)  
D screw locks altered to conform to GEC type. Issue 3 must be implemented on TCSU, other customers may use previous issues.
- Iss 4 (83/15641)  
Paint finish changed from Epoxy to Acrylic

- F Iss 5 (83/15801)  
Screw locks to be modified to M6 welded nuts with lead in on the screws.
- Iss 6 (83/16417)  
SIEMENS logo added controller outercases, outercases modified as necessary.
- Iss 7 (83/17379)
- F Lid now only sealed on three sides and seal removed from bottom edge of door, in order to alleviate condensation problems.

## 667/1/20252/000 T400S Controller Partial Assembly.

- Iss 4 (83/15652)  
Change to incorporate change 83/15575
- CM D screw locks altered to conform to GEC type. Issue 4 must be implemented on TCSU, other customers may use previous issues.
- Iss 5 (83/15641)  
Paint finish changed from Epoxy to Acrylic
- F Iss 6 (83/15801)  
Screw locks to be modified to M6 welded nuts with lead in on the screws.  
This is an interim change until they can be changed on new production to M10
- Iss 7 (83/16033)  
Modifications to conform to Electricity at Work Act. Only new controllers produced to this standard.
- Iss 8 (83/16417)  
SIEMENS logo added controller outercases, outercases modified as necessary.
- Iss 9 (83/17352)  
Metal document pocket increased in size for TCSU city of London, also outercase material changed from 2mm Zintec to 2.5mm Aluminium.
- Iss 10 (83/17509)  
Rating label moved from this assembly to Preliminary assembly 667/1/20240/etc to ensure that it is fitted.

## 667/1/20256/000 Controller Panel assembly T400S

- Iss 5 (83/15467)
- SM Mandatory change, external shakeproof washer added to earth studs to ensure a good earth.
- Iss 6 (83/15730)
- M,CM Labels added to describe the functions of the switches and fuses on the master and controller fuse panels. Labels must be fitted on any controllers shipped after 1/9/90 and any requested by customers.
- Iss 8 (83/16033)  
Modifications to ensure conformity to Electricity at Work Act. Only new controllers produced to this standard, no retrospective action.
- Iss 9 (83/16202)  
No effect on operation
- Iss 10 (83/18406)  
No effect on operation
- Iss 11 (83/18540)  
No effect on operation
- Iss 12 (ANL00704)  
Longer taptite screws - no effect on operation.



	667/1/20258/000 Master Switch Panel T400S	
	Iss 5	(83/15351)
CM		Change to maintenance socket to make it a switched socket. Iss 5 must be used for TCSU and if requested on works order otherwise use previous issues.
	Iss 6	(83/15467)
SM		Mandatory change, external shakeproof washer added to earth studs to ensure a good earth.
	Iss 7	(83/15646)
A		Increased wire size to enable it's use with high lamp currents over 13 amps, any controllers switching less than 13 amps may use Iss. 6
	Iss 8	(83/15730)
M		Labels added to switch covers to show fuse sizes and functions. They must be added to all controllers shipped after 1/10/90.
	Iss 9	(83/16033)
		Modifications to ensure conformity to Electricity at Work Act. Only new controllers produced to this standard, no retrospective action.
	Iss 10	(83/16202)
		No effect on operation
	Iss 11	(83/17472)
		No effect on operation
	Iss 12	(ANL00704)
		M3 x 10 taptite length changed to 12mm – No effect on operation
	Iss 13	(ANL01052)
		Earth label added. No effect on operation.
	667/1/20277/000 T400S First Additional Termination Panel	
	Iss 2	(83/16502)
A		Additional holes added for mounting of 48V wait drive kits.
	667/1/20277/001 T400S Second Additional Termination Panel	
	Iss 2	(83/16502)
A		Additional holes added for mounting of 48V wait drive kits.
	667/1/20279/000 Equipment Mounting Frame T400S	
	Iss 3	(83/15573)
		This issue must be used on TCSU contracts. Including 707455 & 707456. Previous issues may be used for other contracts.
	667/1/20284/010 Manual Panel Assembly Simple	
	Iss 2	(83/15650)
M,F		Mandatory change to add the DFM lamp assembly which was missed. Manual panels to be inspected during P.I.s
	Iss 3	(83/15859)
		No effect on operation
	Iss 4	(83/15999)
		No effect on operation

	Iss 5	(83/16202)	No effect on operation
	Iss 6	(83/16556)	No effect on operation
	Iss 7	(83/18224)	No effect on operation
	667/1/20285/000 Additional Termination Panel Kit T400L		
SM	Iss 3	(83/15535)	Mandatory change to add earth wire.
	Iss 6	(83/16502)	
A			Additional holes added for mounting of 48V wait drive kits.
	667/1/20287/000 Distribution Panel T400L		
	Iss 4	(83/15457)	
M			Mandatory change to crimps to suit the wire size, as they did not crimp correctly
	Iss 5	(83/15444)	
A			Additional holes to allow the detector L bracket to be fitted. If no L brackets required then previous issues may be used. Prior issues may be upgraded to this issue by modification in accordance with 667/CH/20287/000.
	Iss 7	(83/15593)	
A,F			Wire size increased to enable it's use with high lamp currents over 13 amps, any controllers switching less than 13 amps may use Issue 5
	Iss 8	(83/15730)	No effect on operation
	Iss 9	(83/16202)	No effect on operation
	Iss 10	(83/18377)	No effect on operation
	Iss 11	(83/18406)	No effect on operation
	Iss 12	(83/18540)	No effect on operation
	667/1/20290/000 T400L Controller Partial Assembly		
	Iss 3	(83/15575)	
CM			Stool mounting bolts stiffening plates added. D screw locks altered to conform to GEC type. This issue must be implemented on TCSU. other customers may use previous iss 2.
	Iss 4	(83/15641)	Paint finish changed from Epoxy to Acrylic
	Iss 5	(83/15801)	
F			Screw locks to be modified to M6 welded nuts with lead in on the screws. This is an interim change until they can be changed on new production to M10
	Iss 6	(83/15953)	
A			To cover two OMUs in one housing.
	Iss 7	(83/16417)	SIEMENS logo added controller outercases, outercases modified as necessary.

	Iss 8	(83/16722)	
F		Plastic document pocket replaced by metal one.	
	Iss 9	(83/17352)	
CM		Metal document pocket increased in size for TCSU city of London.	
667/1/20295/000 Master Switch Panel T400L			
	Iss 4	(83/15351)	
CM		Change to maintenance socket to make it a switched socket. This issue must be used for TCSU and if requested on works order, otherwise use Iss 3.	
	Iss 5	(83/15467)	
		Mandatory change, external shakeproof washer added to earth studs to ensure a good earth.	
	Iss 6	(83/15646)	
A		Wire size increased to enable it's use with high lamp currents over 13 amps, any controllers switching less than 13 amps may use Iss 5.	
	Iss 7	(83/15730)	
M		Labels added to switch covers to show fuse sizes and functions. They must be added to all controllers shipped after 1/10/90	
	Iss 8	(83/16202)	
		No effect on operation	
	Iss 9	(83/17472)	
		No effect on operation	
	Iss 10	(83/18377)	
		No effect on operation	
	Iss 11	(ANL01052)	
		Earth label added. No effect on operation.	

## 667/1/20620/002 T400 'Wedding Ring' addition kit

	Iss 2	(83/16000)	
		Increase of length of earth wire to 2 metres.	

## 667/1/20673/001 T400S additional double 13 Amp Socket kit with 30mA RCD.

	Iss 2	(83/15653).	
A		Change to double 13A RCD socket unit	
	Iss 3	(83/16036)	
M		Addition of label. All Controllers and Pelicans fitted with double sockets to be fitted with this label.	

## 667/1/20673/002 T400S additional double 13 Amp Socket kit with 30mA RCD

	Iss 2	(83/15718)	
A		Change to double 13A RCD socket unit.	
M		Wiring route change to meet IEE regs.	
	Iss 3	(83/16036)	
M		Addition of label. All Controllers and Pelicans fitted with double sockets to be fitted with this label.	

## 667/1/20680/000 T400L Strathclyde Controller Mod Kit

	Iss 2	(83/15778)	
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- SM Mandatory Cables, labels and spare fuse boxes to act as blanking plates must be fitted.
- Iss 3 (83/15815)  
This I/L raised in sympathy with sub assemblies, due changes of issue on the sub assemblies and component parts. Changes to items following first production build. No effect on Field Services.
- Iss 4 (83/15970)  
Change to part number and build structure. This was done as an aid to production, T400S & L PELICANS now built as individual items. No effect on Field Services.
- Iss 5 (83/16213)  
No effect on operation
- Iss 6 (83/17697)  
No effect on operation
- Iss 7 (83/17316)  
No effect on operation

## 667/1/20699/000 T400 L/S Regs Signs 10 amp Fuse Kit

- Iss 2 (83/15730)
- M Labels added to describe the functions of the switches and fuses. Labels must be fitted on any controllers shipped after 1/9/90, any requested by customers and any that have the new labels fitted on the basic assemblies.

## 667/1/21001/000 T400S Ferranti OMU mounting Kit

- CM Iss 2 (83/15765)  
Mandatory on TCSU orders. Adding the interface cable.
- CM Iss 3 (83/15787)  
Mandatory on TCSU orders. Adding labels and cage nuts.
- Iss 4 (83/15816)  
Change of fixings to ST/ST. During annual inspection any existing frames showing corrosion to have components changed.

## 667/1/21001/001 T400L Ferranti OMU mounting Kit

- Iss 2 (83/16000)  
Change of cable length from 1.6 to 2m.
- Iss 3 (83/16013)  
Change of panel

## 667/1/21004/000 T400 Ferranti OTU mounting Kit

- CM Iss 2 (83/15787)  
Mandatory on TCSU orders. Adding labels and cage nuts.
- Iss 3 (83/15812)  
Change of fixings to ST/ST. During annual inspection any existing frames showing corrosion to have components changed

## 667/1/21008/000 BT Cable Termination Kit

- CM Iss 2 (83/15787)  
Mandatory on TCSU orders. Adding labels.
- Iss 3 (83/16342)

CM		Mandatory on TCSU orders. Drawing modified to show build requirements to meet TCSU acceptance..
	Iss 4	(83/17432)
		667/1/21010/000 50-0-50V T400L Mod Kit
	Iss 2	(83/15797)
SM	Iss 3	Mandatory. Safety label added 50-0-50V working
		(83/15940).
A		Addition of 110volt version of microwave detector and mod to signal head to Items list.
		667/1/21010/001 50-0-50V T400S Mod Kit
SM	Iss 2	(83/15797).
		Mandatory. Safety label added 50-0-50V working.
	Iss 3	(83/15940).
A		Addition of 110volt version of microwave detector and mod to signal head to Items list.
		667/1/21016/001 50 - 0 - 50v Dimming transformer kit
	Iss 2	(83/15940)
		Change of bolts, to assist production assembly. No effect on Field Services.
	Iss 3	(83/18393)
		667/1/21150/000 T400L Gas Plinth
	Iss 4	(83/15838)
		Various minor mods following first production build. No effect on Field Services.
	Iss 5	(83/15940)
F		Mod adds missing bracket to drawing.
F		Re-finishing where plating removed in grinding following welding. No effect on Field Services.
	Iss 6	(83/17929) Makes Issue 5 Current
		667/1/21150/001 T400S Gas Plinth
	Iss 3	(83/15838)
		Various minor mods following first production build. No effect on Field Services.
	Iss 4	(83/15940)
F		Re-finishing where plating removed in grinding following welding. No effect on Field Services.
	Iss 5	(83/17929) Makes Issue 4 Current
		667/1/26910/000 T400U (1996) Controller Assembly (Large)
	Iss 1	First issue
	Iss 2	(ANL00373) Change prior to 1 <sup>st</sup> delivery

- Iss 3 (ANL00400) Change prior to 1<sup>st</sup> delivery (brings drawings up to as build state of delivered assemblies).
- Iss 4 (ANL00421) various items added & amended after first production build
- Iss 5 (ANL00462) Now has 2 warning labels
- Iss 6 (ANL00454) Chassis dimensions tightened
- Iss 7 (ANL00666) Minor corrections to items lists
- Iss 8 (ANL02005) New Hedgehog design added

667/1/26910/100 T400U (1996) Controller Assembly (Small)

- Iss 1 First issue
- Iss 2 (ANL00373) Change prior to 1<sup>st</sup> delivery
- Iss 3 (ANL02005) New Hedgehog design added

667/1/26924/000 TCUGL Equipment mounting frame

- Iss 1 First issue
- Iss 2 (ANL00343) Corrections following first build.
- Iss 3 (ANL00389) Items lists revisions following 2<sup>nd</sup> build
- Iss 4 (ANL00733) Slot lengthened to ease lock closure.
- Iss 5 (ANL00867) Electricity compartment label fitted, manual panel cable lengthened hedgehog insulators fitted, BT terminals and box fitted.
- Iss 6 (ANL01025) Hinge fitment clarified

667/1/26924/100 TCUGS Equipment mounting frame

- Iss 1 (ANL00902) First issue.

667/1/26922/000 TCUGL Controller Swing Frame kit

- Iss 1 First issue
- Iss 2 (ANL00343) Corrections following first build.
- Iss 3 (ANL00424) Reference to production aid added.
- Iss 4 (ANL00462) Minor clarification for production build
- Iss 5 (ANL00733) Slot lengthened to ease lock closure.
- Iss 6 (ANL00867) Electricity compartment label fitted, manual panel cable lengthened hedgehog insulators fitted, BT terminals and box fitted.
- Iss 7 (ANL01892) Extension to manual panel cable added and solar cell connectors corrected
- Iss 8 (ANL00824) Correction required due to MAPs system data corruptions – no effect on equipment.

667/1/26922/100 TCUGS Controller Swing Frame kit

- Iss 1 First issue
- Iss 2 (ANL00343)
- Iss 3 (ANL00867)
- Iss 4 (ANL00733)

667/1/25161/002 T400U/L (TCSU) IRM Kit (Modem panel)

- Iss 1 First issue
- Iss 2 (ANL00725) Minor changes (screws, washers)
- Iss 3 (ANL00791) Assy drawing added to items list

667/1/26440/000 T400 (TCSU) IRM Kit

- Iss 1 First issue

### **6.7. General Hardware – TCUG outercase**

Refer to the following document for issue state details for T400 versions installed in the TCUG standard cases:-

667/UQ/25300/000 As-built document

Issue 9