Department for **Innovation, Universities** & **Skills**

SUPPLEMENT TO CERTIFICATE

Series: 019 Revision 1

Certification No 2536 (Supplement No 68)

Certification No 2619/43* (Supplement No 62)

(*) Refers to the dispenser only, the self service or other devices described in these certificates do not form part of this approval.

Submitted by: ***Sainsbury's Supermarkets Ltd***
33 Holborn
London
EC1 2HT

Authorisation is hereby given by the Secretary of State for Innovation, Universities and Skills for the following Certificate of approval relating to a pattern of a liquid flowmeter to be modified as described below.

As described in the following Certificates but modified to have a self service device, as detailed in the descriptive annex, and having the following characteristics:-

DISPENSER:	*Dresser Wayne dispensers as described in Certification No 2536 and 2619*
SITE CONTROL & POINT OF SALE SYSTEM:	Retalix Forecourt Server and Storepoint Point
OUTDOOR PAYMENT TERMINAL:	*Dresser Wayne Opus iX*

Signatory: G Stones
for Chief Executive
National Weights & Measures Laboratory
Department of Trade and Industry
Stanton Avenue
Teddington
Middlesex TW11 0JZ
United Kingdom

Reference No: T1118/0040

Date: 13 April 2010

CONTENTS

1 INTRODUCTION

2 CONTROL EQUIPMENT

3 CONSTRUCTION

4 OPERATION

5 AUTHORISED ALTERNATIVES

6 RECOMMENDED TESTS

7 CERTIFICATE HISTORY

ILLUSTRATIONS

Figure 1 Forecourt wiring

Figure 2 Opus iX Hardware Architecture

Figure 3 Logical Architecture

Figure 4 Opus iX mounted on dispenser

Figure 5 Opus iX Head

Figure 6 Printer and Switch Access Door

Figure 7 Sample Receipt

Descriptive Annex

1 INTRODUCTION

The dispenser is connected to the Retalix Forecourt Server and Storepoint Point combined kiosk control unit and point of sale (POS) system, which incorporates a Dresser Wayne Opus iX combined calculator and outdoor payment terminal (OPT). The Opus iX housing incorporates unmodified iGEM calculator electronics described in the dispenser certificate. Powerline communication is used to allow high speed communication with pumps and terminals over existing armoured or mineral insulated cables.

2 CONTROL EQUIPMENT

2.1 Forecourt Server

This is an integrated system located inside the kiosk, it is based on the Retalix Forecourt Server (RFS) software, used in conjunction with Retalix Storepoint Point of Sale software.

The RFS application software runs on the kiosk POS PCs, along with Retalix Storepoint POS software.

The RFS controls the operation of up to 16 double sided dispensers dispensers and OPT's for both Pay at Pump and Pay in Kiosk transactions.

OPT on-line authorisation communications pass through the same channel as 'pay in kiosk' transactions.

2.2 Point of Sale Terminals

Each kiosk may have up to four POS PCs capable of providing operator control of pumps, and retrieval of pump transactions for payment. RFS software is installed in two POS till PCs in the kiosk, known as Master and Alternate. If the Master till fails, the Alternate may be manually or automatically set to take over forecourt control (and vice versa), and suppress any control activity from the other RFS till. Where more than two tills are installed, Master and Alternative are normally located on the tills least used for kiosk sales.

The POS Terminal communicates with the pumps via two or more Kiosk Interface Boxes mounted in a rack cabinet.

These PCs run two side by side applications:

- Forecourt Server – low level real-time control of up to 16 double sided dispensers and Opus iXs, active on only one PC at any time.
- Point of Sale – for kiosk paid fuel and other sale transactions.

2.3 Uninterruptible Power Supply

In the event of a mains power failure, the server/POS PC's and Ethernet switch are powered via a separate circuit connected to an Uninterruptible Power Supply capable of providing at least 15 minutes of operation after power failure, allowing transactions outstanding at the point of failure to be paid for.

2.4 Dispenser Calculator

Double sided dispensers communicate with the Forecourt Server application using a single communication channel (TCP socket) on the Powerline bus, with Dresser Wayne's proprietary DART communication protocol.

3 CONSTRUCTION

3.1 Kiosk Interface Box

A 19in rack cabinet located inside the kiosk is used to house two or more Kiosk Interface boxes, as well as the kiosk Ethernet switch.
Each Dispenser (including OPTs) uses a separate data cable pair to communicate with the Kiosk. All data cables are connected to one of the Kiosk Interface boxes for conversion to Ethernet data.
In the event that the Fireman's or Operator's emergency switches are operated, the Kiosk Interface box is powered down.

3.2 Ethernet Switches

The Kiosk Interface Boxes communicate with the NCR POS PCs via an Ethernet Switches. This switch also carries POS system related data.
Standard 24 port models are used.

3.3 Integrated Forecourt server and Point of sale terminals

Each server/POS uses an NCR RealPOS 80 PCs. Windows 2000 operating system is used in this application, and interface to the Kiosk Interface Box is via the kiosk Ethernet switch.

Each sales position uses an LCD operator screen and keypad.

3.4 Powerline communication

The Powerline communication hardware comprises:

a) 2 to 4 Kiosk Interface Boxes, dependent on site size, mounted in the rack cabinet. Each of these provides four dispenser connections from one Ethernet connection to RFS till PC.
b) In each pump, a module converts Powerline back to Ethernet, for use by the OPT iXPay controller board.

Each dispenser data cable carries three separate communication channels (TCP sockets):

- Two OPT channels, one for each side

One Pump Calculator channel, serving both sides

3.5 Opus iX calculator and outdoor payment terminal

The Opus iX terminal consists of the following parts:

a) Calculator, with galvanized steel chassis containing Processor board, Interface board, two Display boards and Power Supply.

b) Two mirrored OPT chassis for left and right fuelling positions, with chassis constructed from galvanized steel. Each OPT position incorporates the following sub-assemblies:
    - Chip and Magnetic Card reader in secure housing
    - PINpad and Security Processing Module in secure housing
    - iXPay controller board
    - LCD display assembly with 8 soft keys
    - 80mm thermal Receipt Printer module with motorised guillotine
    - Barcode scanner module

3.5.1 Card Reader

The Card Reader module comprises a die-cast metal card throat plus interface electronics. Chip data is read when the user has fully inserted their plastic card; magnetic stripe data is read when the card is withdrawn. A solenoid operated retaining latch is engaged when a chip card is detected to prevent card removal while the card is being read or written to. This latch is de-activated after 30 seconds unless released earlier by the application software.
Card data is encrypted by a microcontroller for secure transmission to/from the Secure Processing Module (SPM) via a serial interface. Power is derived from the SPM.
The internal card reader electronic assembly is contained within a sealed metal housing. Complex tamper detection methods are used to ensure that any attempt to access the internal assemblies results in instant erasure of communication encryption key information, rendering the unit unusable.

3.5.2 Secure Processing Module

The PINpad switches are contained within a sealed secure tamperproof housing, along with the secure microcontroller and memory containing private keys used for card processing. Any attempt to open or displace the housing will result in complete memory erasure, including private keys. The SPM communicates with the iXP board via a USB interface.
On the rear of the SPM is mounted a PCB used for power and data distribution. Into this are connected the Card Reader and Soft Keys.

3.5.3 LCD Display

The customer facing Display comprises a 320 x 240 pixel monochrome LCD (144mm diagonal) to provide instructions and status information to users. The display incorporates a backlight to ensure user legibility under all normal forecourt lighting conditions, and a robust window for protection. Except during the chip card PIN entry phase, all Display messages are transmitted from the Forecourt Server application on the POS PC.

3.5.4 iXP Procesor Board

Each OPT position contains a processor card. This uses a 32 bit RISC processor, 128Mb RAM and an SD card interface. Windows CE 5.0 operating system is used to manage the SD card and RAM filespace, and securely load firmware from SD card into the SPM, and load application programs into RAM during startup.
Application security is controlled by cryptographically signing all programs using 160 bit signatures. Only signed programs will be accepted for execution by the operating system. Upgrade firmware transmitted from SD card to SPM uses an addition proprietary security, in accordance with EMV (Chip & PIN) regulations.

3.5.5 Receipt Printer

A thermal receipt printers is mounted on the front panel of each OPT position. These use 80mm thermal paper and are connected to the iXP Controller board via a USB interface. Paper Low, Paper Out, and Paper Jam detection is also provided, causing messages to be forwarded to the Forecourt Server.
A lockable Printer Hatch gives access to change paper rolls. This internal compartment only allows access to the printer mechanisms, and does not allow access to other internal assemblies, live terminals, etc.

3.5.6 Powerline Pump Module

Each dispenser incorporates a Powerline Pump Module that interfaces the two iXP Ethernet ports to external data cabling to the kiosk, providing a 6Mbs communication channel.provides data routing between RS-485 bus and the relevant internal module.
Galvanic isolation via signal transformers ensures immunity from electrical forecourt noise, and volt free conductors when forecourt power is removed.

3.5.7 Power supply

All OPT components in a position are powered from a 24vDC power supply.

3.5.8 Environmental Control

Each Opus iX Cassette incorporates a thermostatically controlled heater with fan to ensure that the internal electronics are operated within operational temperature range over a wide ambient temperature range. This also aims to prevent internal condensation which can cause paper jams, etc.

4 OPERATION

The Opus iX system is intended to provide attended operation during the day, and unattended operation at night.
The dispensers and OPTs are controlled by means of the proprietary DART protocol. The Forecourt Server communicates via three TCP sockets, one for each OPT position, and one for both sides of the pump.

4.1 Kiosk Transactions

A Kiosk payment transaction is initiated by the customer pressing the ‘Pay at Kiosk’ Opus iX Soft key. The Opus iX display prompts the customer to lift the nozzle; fuelling begins when the kiosk operator authorises the pump. When the nozzle is replaced, the display prompts the customer to pay in the kiosk. The operator concludes the transaction on the POS terminal in the normal manner.
No value or volume data is displayed or printed by the Opus iX for kiosk transactions.

4.2 Pay at Pump Transactions

Payment at the Pump may be initiated by the customer by:

- Pressing the Pay at Pump function key
- Inserting a payment or loyalty card
- Scanning a loyalty card or coupon

The customer is then prompted to insert card, enter PIN etc as required. Payment cards are authorised by the POS application, in the same manner as kiosk payments. These normally involve an on-line dialogue with the acquiring bank.
After the card has been authorised, the customer is prompted to remove it from the reader, after which the customer is prompted to lift the nozzle and begin fuelling.
When the nozzle is removed, the Display prompts the customer to select if a receipt is required. If no selection is made, a receipt will be printed. When the nozzle is replaced, if selected, a VAT receipt is printed.
After the transaction concludes, the display reverts to 'Pay at Pump / Pay in Kiosk' idle screen ready for the next customer. No transaction or card data is retained in the Opus iX.

4.3 Receipt Information

The Opus iX receipt uses similar layout as a kiosk receipt. The following data is given:

- Site details
- Fuelling position number
- Date/time
- Fuel Grade
- Transaction Volume in Litres
- Transaction Value
- VAT value
- Card transaction details

4.4 Duplicate Receipts

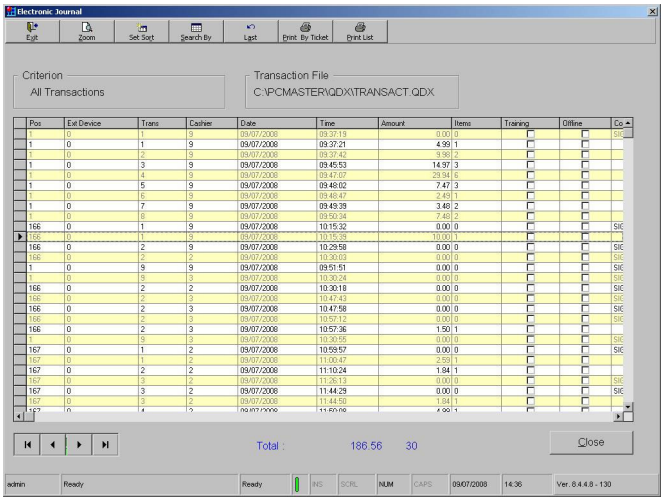
Following a Pay at Pump Opus iX transaction, the same card may be re-inserted into any Opus iX on the site within a period (typically 24 hours) to print a receipt. If a receipt was printed during the original transaction, a duplicate receipt, clearly marked as 'Duplicate', will be printed.

4.5 Reprinting Receipts

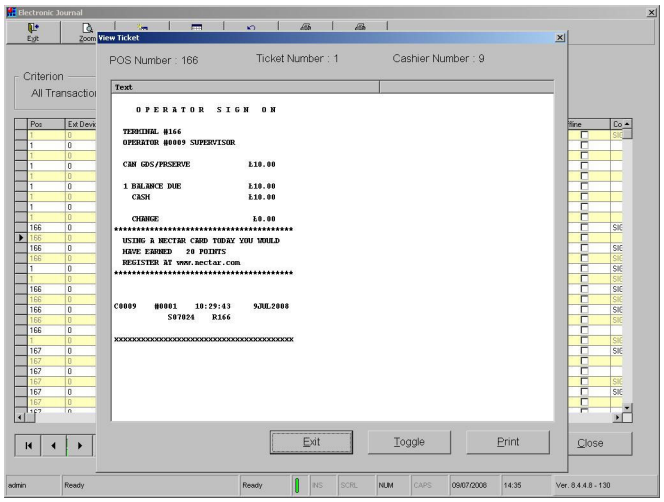
In the event that a customer has not been able to receive a receipt for an OPT transaction, a duplicate receipt may be obtained from the Master File Server PC. This is normally located in the store, and accessed by Customer Support personnel.

A duplicate receipt is obtained on the MFS as follows:

1. Log on to MFS PC and run Front Office application.
2. Log on to Front Office
3. Select Utilities\Electronic Journal to display a list of stored transaction records



4. Press ‘Select’ button. Select required search criteria from the list (e.g. time, OPT till number) then press ‘Select’.
5. Browse through the resulting list, then selecting suitable entry and press ‘Zoom’ button to display the receipt image.



6. If this is the required receipt, press ‘Print’ button to produce a hard copy on the printer.

4.5 OPT printer faulty

The Forecourt Server continuously monitors the Receipt printer status. If Paper Low is detected, the idle display warns the customer “Receipt may not be available, Paper Low”. If Paper Out or Paper Jam is detected, the idle display warns the customer “Receipt not Available”. It is then the customer’s choice whether to proceed with a Pay at Pump transaction at that fuelling position.

4.6 Interlocks and security

4.6.1 Mechanical security

Internal access to the Opus iX requires the Printer hatch to be opened. This is secured by a mechanical lock and key.

Once opened, it is only possible to access paper rolls, and pump configuration switches (Figure 6).

Engineers with different keys are able to open the front and rear faces of the head to gain access to all internal components for maintenance and repair.

4.6.2 Electronic security

Unlocking the Printer hatch at any time (including when power is off) triggers a microswitch which causes a message to be sent to the Forecourt Server, where the event is logged as a security breach. During manned operation, the kiosk operator is alerted to this situation.

Card Reader and PINpad modules incorporate complex tamper detection mechanisms. In the event that the Card Reader tamper detection is triggered, the Card Reader ceases to operate.

5 AUTHORISED ALTERNATIVES

5.1 Styling

The equipment will always be contained within painted plastic casework. The styling and colour of the casework or front panel may be modified in accordance with the associated dispenser, or if it is mounted within the dispenser casework.

5.2 Weighing instrument

Any weighing instrument having a test certificate in accordance with The Council Directive 90/384/EEC on Non-Automatic Weighing Instruments may be connected to the server/POS PC. The software controlling the operation of the weighing instrument is described in NWML Test Certificate GB-1288.

6 RECOMMENDED TESTS

The following operational tests are suggested:

6.1 Indication Opus iX transaction started

- Either Press ‘Pay at Pump’; check that display prompts for payment or loyalty card,
- Or insert a payment card
- Check that the Opus iX display prompts for PIN.
- POS display icon should indicate OPT card transaction in progress
- Press CANCEL and remove card, screen returns to Idle screen.

6.2 Indication of security breach

- Open printer hatch, the display changes indicating the OPT is unavailable.
- POS operator display indicates printer hatch opened
- Close printer door and screen returns to Idle screen

6.3 Opus iX Pay at Pump transaction

- Insert a payment card, the OPT display changes stating the card will be authorised
- Using the PINPad enter the correct PIN number (if requested)
- Once payment authorisation is complete, lift nozzle and dispense fuel
- POS display indicates OPT transaction in progress and details can be displayed.
- Return nozzle and a receipt will be printed.
- Verify that receipt is printed with correct volume and value, site name & address, transaction number and card type.
- OPT transaction details cleared from POS without any operator intervention.

6.4 Pay in Kiosk Transaction

- Remove nozzle, the display prompts user to select Pay at Pump or Pay in Kiosk
- Select 'Pay in Kiosk'
- Opus iX Display shows 'Waiting for kiosk authorisation'; POS shows dispenser is 'calling'.
- When cashier authorises pump, Opus iX displays 'Fuelling'.
- Replace nozzle, the OPT screen returns to Idle screen.

6.5 OPT Test Card operation

In order that Trading Standards Officers may perform Test deliveries via the OPT, a Test Card facility has been incorporated into the software. The Test Card is normally held securely at the store.
Test Card operation simulates normal Pay at Pump operation, but with the following differences:

- A magnetic stripe card is used.
- A maximum of 2 litres may be dispensed per transaction
- OPT messages are slightly different.

6.6 Software Version Access

6.6.1 OPT software

The OPT firmware version is displayed on its screen for several seconds after start-up. The OPT may be restarted by opening the printer door and momentarily turning off one or both OPT power switches.

Version number: 1.0.14.0

The SPM also incorporates application software. This may be inspected as follows:

Simultaneously press both 2nd from top soft keys
Press 'Diagnostic'
Press 8311 + ENTER on PINpad
Press 'Sys. Info' key

The version numbers of OPT application, SPM (and Card Reader, not controlled) are displayed:

Version:
1.0.14.0
SPM:
1.1.3701.0
Card Reader:
3026-01J

6.6.2 Server POS software

Till PCs use a modified version of Microsoft Windows 2000 operating system. Application software to operate the Point of Sale terminal and Forecourt Server comprises the following programs:

- RFS.exe – real time communication and control of pumps, outdoor payment terminals and tank gauge system.
- POSPump.exe – pump control user interface
- Storeline (WinPOS.exe) – Point of Sale terminal.

Where tills have scales attached, the software to interface to the scale is contained in WPScannerScale.dll.

The versions of these software components can be printed on the receipt printer as follows:

1. Log unto the till as Supervisor:
    - Tap screen to display menu; press Sign On menu button.
    - Enter Supervisor Login, ENTER, Supervisor password, ENTER.
2. Press MORE button until SVR MENU is displayed as shown below.
3. Press SVR MENU; a new set of buttons will appear; press NWML.
4. A list of software CRCs (checksum) and Version Numbers will be printed on the receipt printer.

The software version numbers are:

- POSPump CRC: 49658
  Version: 3.21
- RFS CRC: 53356
  Version: 2. 5. 21
- Storeline CRC: 51801
  Version: 8.4.4.8.180

6.6.3 Alternative software versions

POSPump CRC: 10096
Version: 3.21.120

RFS CRC: 40522
Version: 2, 5, 21, 80

Storeline CRC: 15468
Version 8.4.4.8.200 - patch 33

7 CERTIFICATE HISTORY

ISSUE NO.	DATE	DESCRIPTION
Series: S019	27th October 2008	Certificate first issued as a supplement.
Series: S019Revision 1	13th April 2010	Certificate 2619/62 added to front page Section 6.6.3 added

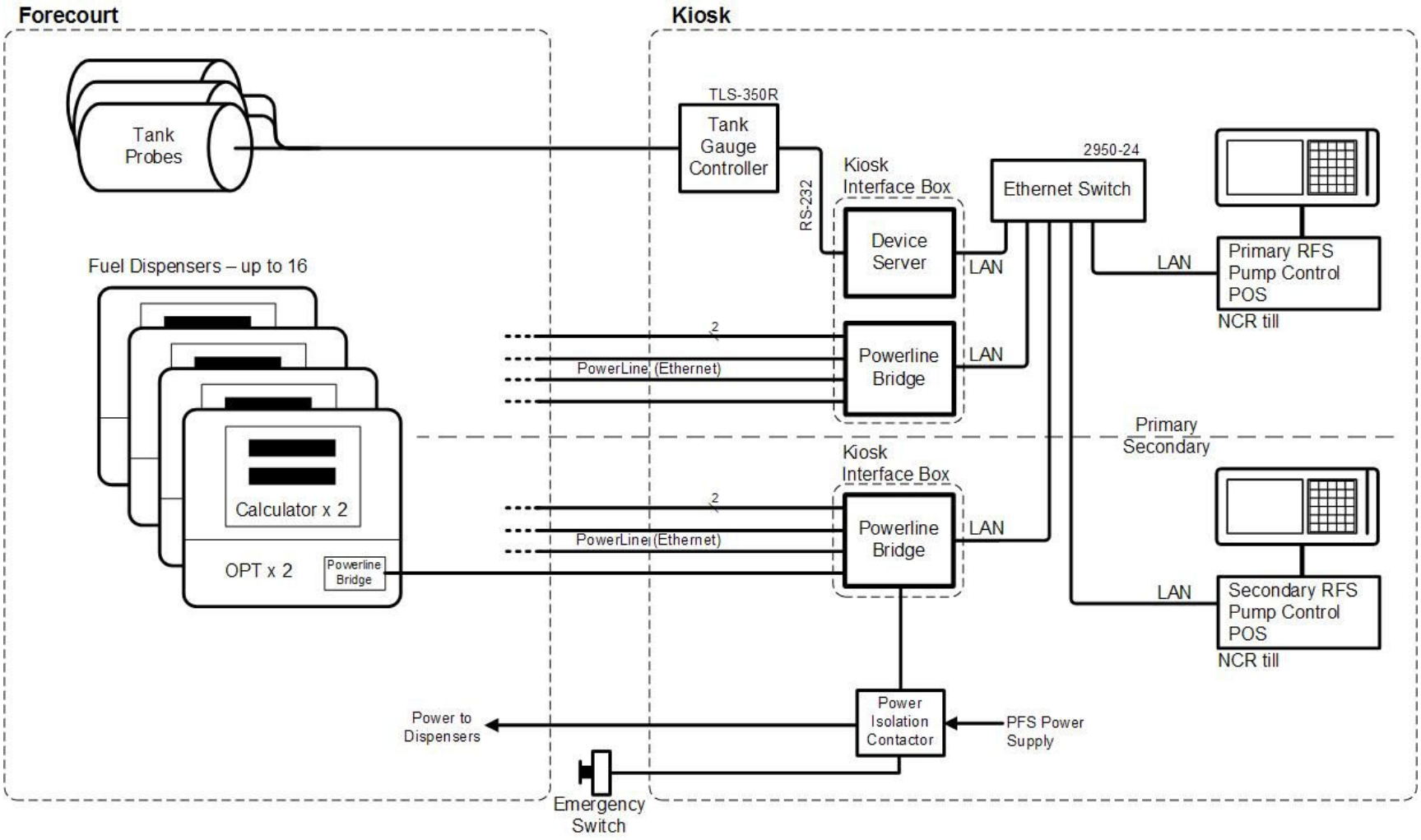


Figure 1 Forecourt Wiring

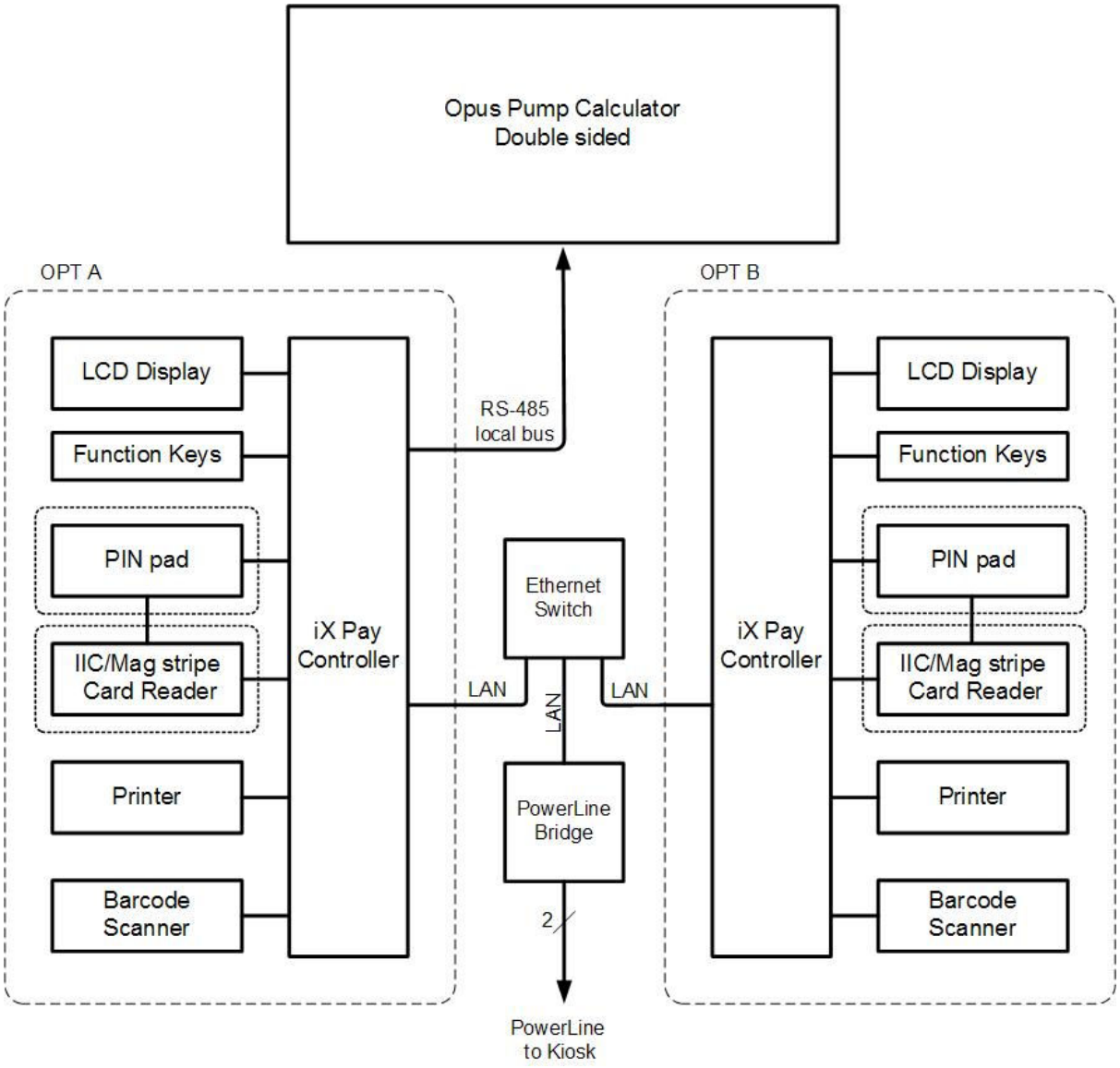


Figure 2 Opus iX Hardware Architecture

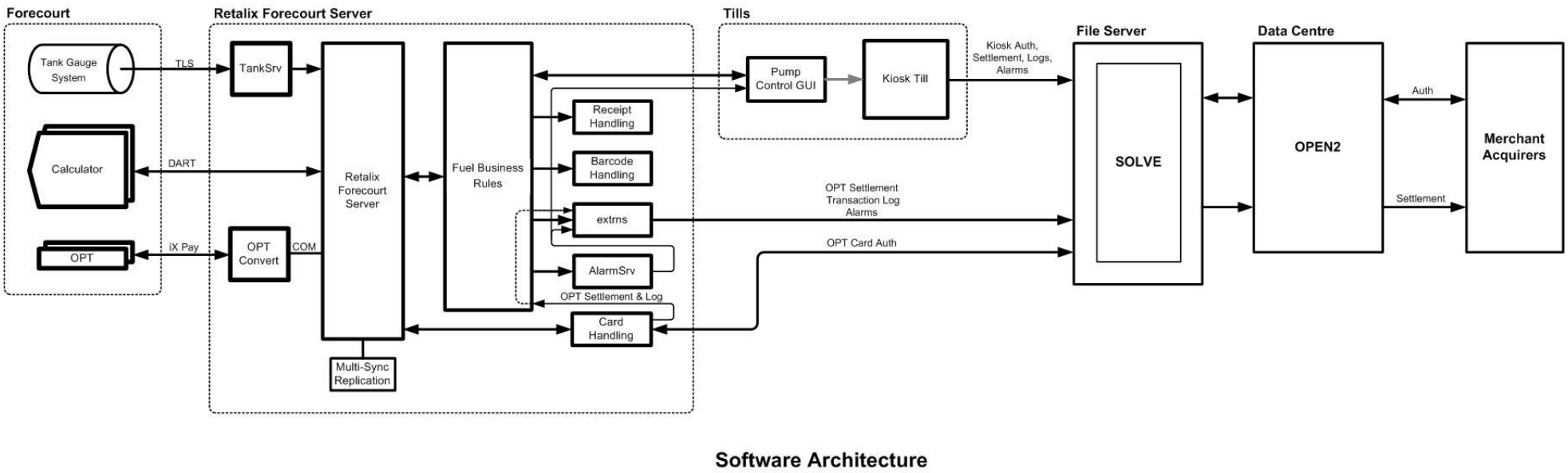


Figure 3 Logical System Architecture

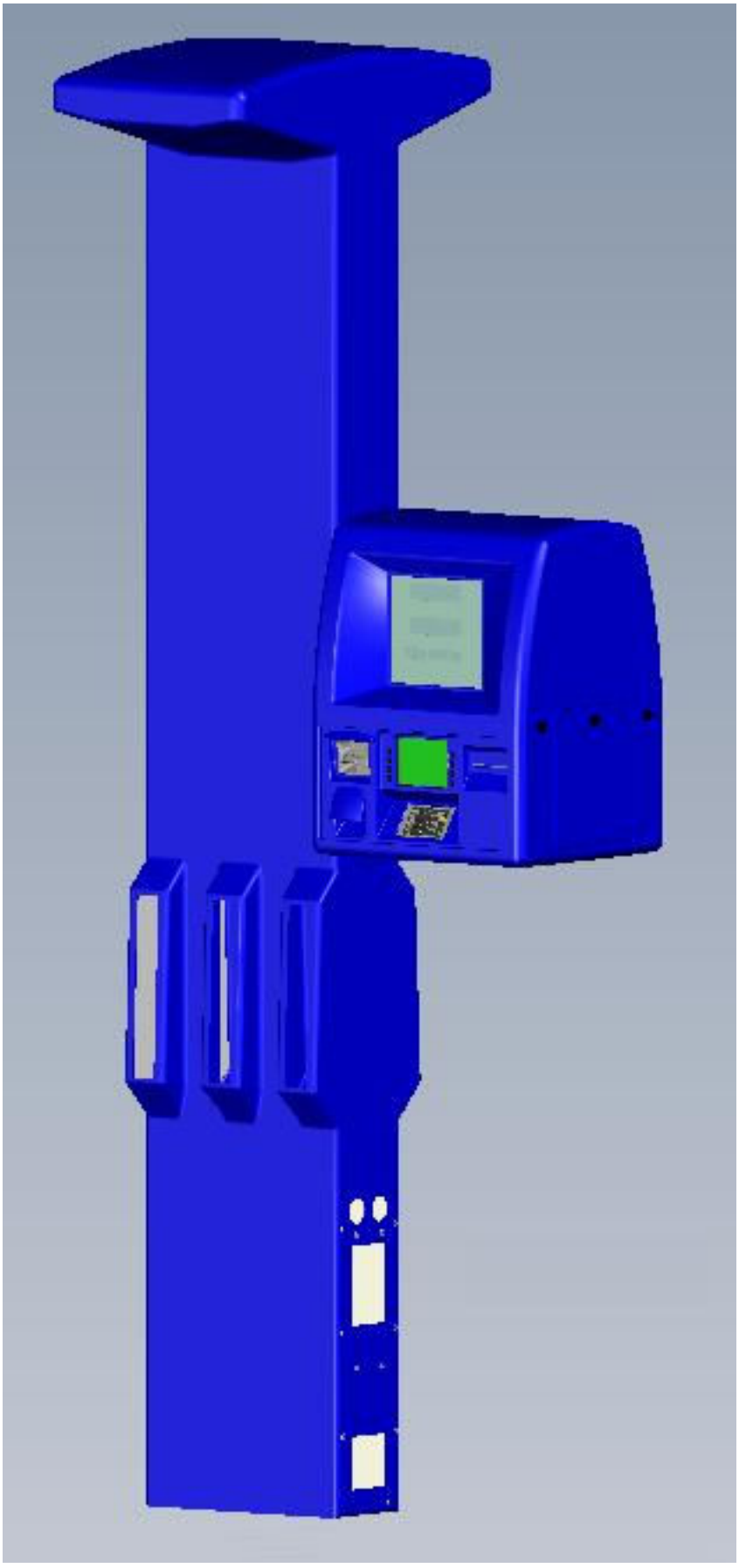


Figure 4 Opus iX mounted on dispenser

Figure 5 Opus iX Head

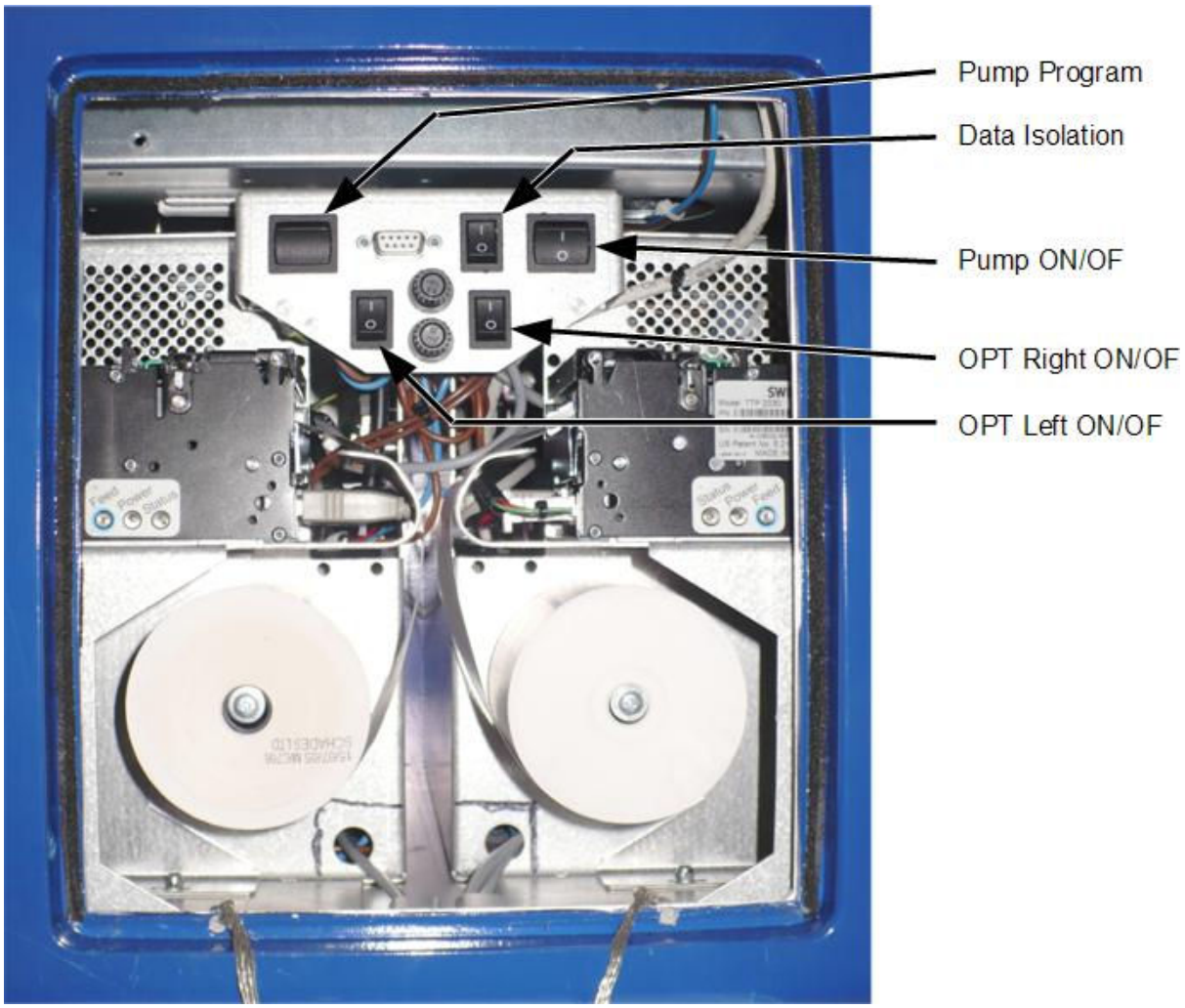
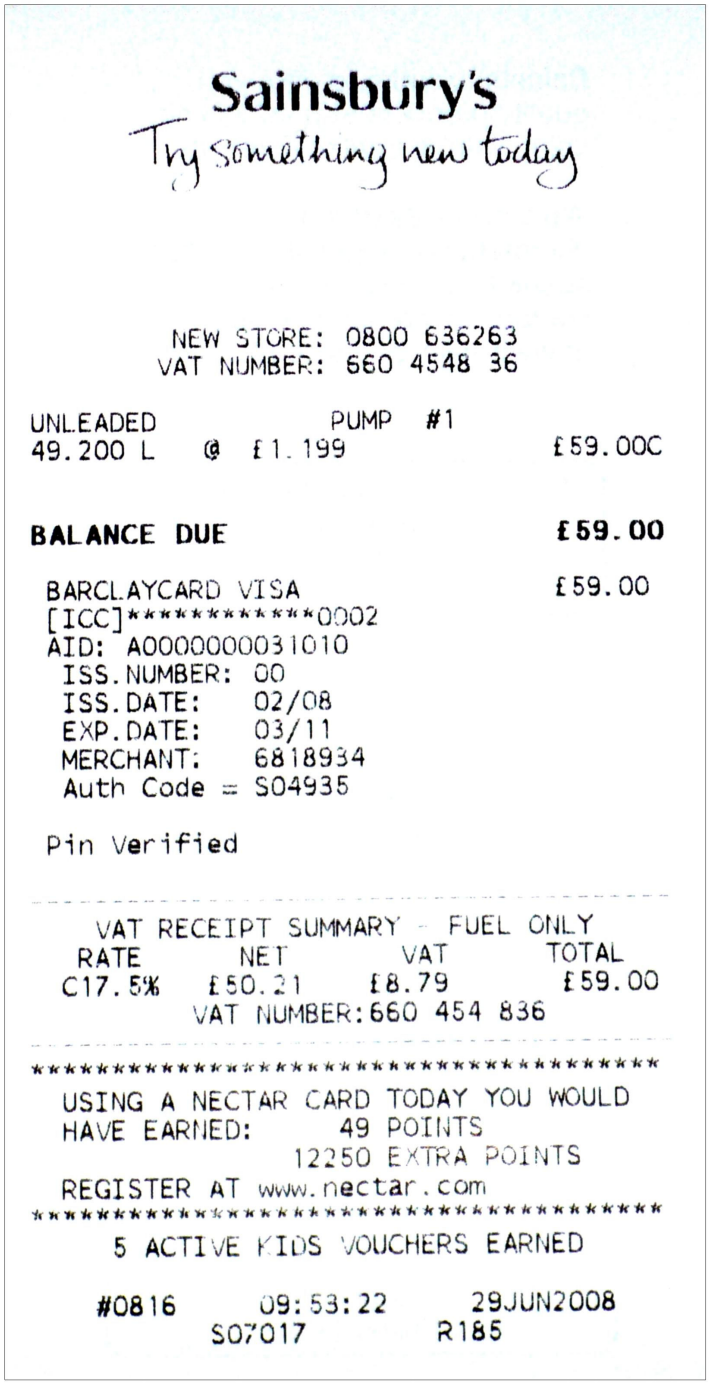


Figure 6 Printer and Switch Access Door



Sainsbury's
Try something new today

NEW STORE: 0800 636263
VAT NUMBER: 660 4548 36

UNLEADED PUMP #1
49.200 L @ £1.199 £59.00C

BALANCE DUE **£59.00**

BARCLAYCARD VISA £59.00
[ICC]**********0002
AID: A0000000031010
ISS.NUMBER: 00
ISS.DATE: 02/08
EXP.DATE: 03/11
MERCHANT: 6818934
Auth Code = S04935

Pin Verified

VAT RECEIPT SUMMARY - FUEL ONLY

RATE	NET	VAT	TOTAL
C17.5%	£50.21	£8.79	£59.00

VAT NUMBER:660 454 836

****
USING A NECTAR CARD TODAY YOU WOULD
HAVE EARNED: 49 POINTS
12250 EXTRA POINTS
REGISTER AT www.nectar.com
****
5 ACTIVE KIDS VOUCHERS EARNED

#0816 09:53:22 29JUN2008
S07017 R185

Figure 7 Sample Receipt

Crown Copyright 2010
NATIONAL WEIGHTS AND MEASURES LABORATORY
(part of National Measurement Office)
Department for Business, Innovation and Skills