IBM 4810 thin client POS terminal Technical Reference

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Please note that all of the features, functions, etc. defined in this document are subject to change without notice. Not all models, features, etc. are announced in all countries, and references in this document are not an indication that IBM will support these items in the future in every country. Consult with your IBM sales professional for assistance in identifying what is available in your country.

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Document information

Summary of Amendments

Changes resulting in document revisions will be summarized in this table in reverse chronological sequence. Revision bars (|) will highlight the text changed in the latest version.

Table 2. Change Summary

Version	Date	Change Description
0.1	12/12/01	Initial version, based on the 4810 spec
2.0	3/31/02	GA level
2.01	4/25/02	update typical power consumption number
2.02	5/6/02	update ID string returned from BIOS
2.03	6/13/02	update memory map note that PCI card height is restricted to 3.5", length limited to 6.5"
2.04	5/15/03	Add 32x models
2.05	7/28/03	Update Cash Drawer attach information for 32x models

Please note that the power supply used on the 4810 is NOT autoranging. There is a switch on the rear of the 4810 that selects the input voltage range. The correct AC supply voltage setting for the power supply <u>must</u> be made prior to installation. Damage requiring replacement of the power supply will result if the switch is set to the wrong voltage setting and the unit plugged into AC power.

Damage caused by an incorrect switch setting is not covered by warranty.

General Description

The 4810 (SurePOS 300) is the IBM RSS response to the low cost thin client requirement being identified by many major retailers. It is similar in function to a PC, but takes advantage of many of the lessons the retail development group has learned in the creation of our mainstream family of POS terminals. It is not a traditional IBM POS terminal system unit because it is designed for distributed environments only, and can attach only RS-232 POS I/O. It has no facilities for battery backup. It is specifically intended as a low cost offering for those environments that are looking for an inexpensive, "thin client" type of solution.

Physically, the 4810 is small box 216mm (deep) by 300mm wide by 90mm tall (8.5"x11.8"x3.6") designed to mount horizontally under the checkstand or counter. There are no provisions for integrating any POS I/O on the unit. Other than a power switch and indicator lights for power, HDD, and LAN activity, there are no functions or features that would require user access.

The 4810 is released with and without internal media. Internal media offerings are traditional HDD or compact flash media.

Boxes with media require either USB floppy or CD ROM drives for software loading/customization, while medialess boxes are designed to be loaded via a LAN. No standalone capability for medialess units exists. Absence of a connection to a working server will mean that a terminal that is powered off cannot be loaded until a working connection to the server is reestablished.

The diagnostics package is dependent on getting a unique diagnostics load image from either the server or a USB attached floppy.

Key attributes:

- **v** socket 370 compatible X86 CPU…specific CPU is dependent on model
    - 31x models use the 866MHz VIA C3
    - 32x models use the 1.2GHz VIA C3
- **v** Memory: 2 DIMM slots for industry standard PC 133 SDRAM (128MB memory standard, 128 and 256MB DIMMS are options, max memory is 512MB);
- **v** standard analog VGA interface (no DVI digital interface);
- **v** one PCI feature card slot (half size). Specifically, card length is limited to 6.5" /165mm (tailgate bracket to card end), height is limited to be equal to the height of the tailgate bracket (approximately 3.5"/88mm above the PCB connector tab.). The vast majority of PCI cards used in POS applications will fall within this requirement.
- **v** a 10/100 Ethernet chip capable of supporting both 10baseT or 100baseTX full or half duplex Ethernet. Network management (WfM 1.1) and wake on LAN function using Magic

Packet technology is implemented (the same LAN chip used on 4694 xx7 models is used on the 4810);

v IBM PS/2 equivalent keyboard and mouse ports;

v parallel printer port - 31x models only

v software (POST/BIOS) configuration (no DIP switches or jumpers that have to be programmed by the user)

v nonvolatile real time clock

v RS232 Ports vary based on model

- 31x models have 4 (2 9-pin standard PC and 2 15-pin powered)
- 32x models have 6 (4 9-pin standard PC and 2 15-pin powered)

v 4 standard PC USB 1.2 ports (no POS powered USB ports)

v AC'97 (Soundblaster) audio support (line/mic in, line out)

- optional HDD (40G/5400RPM) or compact flash adapter. The compact flash adapter ships with a 128MB compact flash memory card installed).
- Cash Drawer Port
  - 31x models do not have a cash drawer port
  - 32x modes have one 24V port 3 IBM cash drawer port

Model identification/features:

Type/Model	CPU	Memory	DASD
4810-310	VIA 866Mhz C3	128MB x 1	none
4810-31H	VIA 866Mhz C3	128MB x 1	40GB HDD
4810-31C	VIA 866Mhz C3	128MB x 1	128MB compact flash
4810-320	VIA 1.2GHz C3	128MB x 1	none
4810-32H	VIA 1.2GHz C3	128MB x 1	40GB HDD
4810-32C	VIA 1.2GHz C3	128MB x 1	128MB compact flash

In order to better understand the differences between the 4810 and traditional PC/POS system units, the following typical features are NOT available on the 4810:

- Floppy (capability for USB attachment)

- CD ROM (capability for USB attachment)

  Boot support for floppy and CD drives is provided in BIOS. Not all USB attached FDD and CD's will work due to inconsistencies in USB boot device industry specs.

- Battery backup

- Ability to integrate I/O

- NVRAM

- Dump switch

- 4690OS support

- Wide variety of POS attachment function (no SIO or powered USB ports are provided)

Video

Video function is provided by the integrated CPU chipset. No separate VGA subsystem is provided, nor is a an AGP slot available. The video subsystem uses system DRAM for video storage. BIOS setup allows the user to allocate up to 8MB of system DRAM to the video subsystem. The video subsystem is capable of supporting modes up to 1600x1200**.**

A video adapter can be installed in the PCI slot.

Drivers are available for DOS, Windows, and Linux.

Compact Flash interface

The 4810-3xC has a type II compact flash socket on a card that mounts in the front of the chassis that is connected to the primary IDE connector.

LAN

The 4810 is shipped with integrated 10/100Mb/s Ethernet support utilizing the National Semiconductor MacPhyter (DP83515) LAN chip. Drivers are available from the major OS suppliers (such as Microsoft or Red Hat) or from IBM's or National's websites.

Depending on software and BIOS setup options, if a unit is off and AC power is available, the LAN function known as wake on LAN is enabled. This feature can be used to cause a terminal that is in either the standby or off state to "wake up" or power up on a specified LAN event. The chips are capable of waking up from the following events:

- link change event (ie any change to the link status)
- pattern match mode
- Magic Packet mode

OnNow is part of Microsoft's power management/system management initiative and is fully described on Microsoft's website. Magic Packet is an industry initiative pioneered by AMD and documentation can be found on AMD's website.

4610 can be preconfigured (via BIOS setup) to work in Magic Packet mode, and requires a address specific Magic Packet frame sent to the terminal to initiate a wake up sequence. This mode is compatible with many industry tools such as IBM Lan Client Configuration Manager (LCCM). The adapter can also be configured to respond to multicast and broadcast modes. Details of configuring the integrated LAN adapter are contained in the LAN chip datasheet. Advanced skills in programming at the hardware level are required to change the default configuration.

Service Strategy

The 4810 is unique in that it has no removable media shipped with the unit. A floppy diagnostic is available that can be used with USB floppies.

Deliverables

Each machine is shipped with the following parts:

    v Product Safety messages book (required by country/IBM safety laws)

    v Install/parts catalog (must be specified at order entry time, this book is not automatically shipped with the unit)

    v a LAN cable (14' - RJ-45 telephone mod plugs on both ends, meets the category 5 UTP requirements).

    v Power cord (country specific…see tables at the end of this document).
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<u>Architecture</u>

The 4810 is designed to appear to a programmer as a standard PCI/plug and play PC equivalent system that has a PCI Ethernet adapter installed. The IDE interface on the motherboard is connected to the optional compact flash adapter or to the optional HDD. Note that the HDD and compact flash are mutually exclusive. When a compact flash device is installed, it appears to the programmer as any other IDE type of device (in other words, it looks just like a hard file).

The specific hardware chips used are the following:

- **v** CPU: VIA C3 866Mhz or VIA C3 1.2GHz

- **v** CPU support- VIA PM8602T ProMedia North Bridge and VIA VT82C686B Super South Bridge)

- **v** Additional RS-232 ports:

  - 31x 2nd set of RS-232 ports: Netmos Nm9835 PCI Dual UART controller

  - 32x 2nd and 3rd set of RS232 ports: 2 Netmos Nm9835 PCI controllers

    - ◆ Cash drawer port functions via an additional port on the controller of the 3rd set of serial ports

- **v** 10/100MB/S Ethernet - National Semiconductor DP83815 MacPhyter.

- **v** Compact flash device: Sandisk SDCFB-128-101 or Hitachi HB288128C5

- **v** Hard disk: Maxtor D540X, 40GB, 5400 rpm, 10mS avg seek)

These vendor websites should be searched for the latest level drivers:

v IBM Retail:	http://www.pc.ibm.com/store/	(Check this first.)
v VIA:	www.viatech.com	
v Intel	www.intel.com	
v Microsoft	www.microsoft.com	
v National Semiconductor	www.nsc.com	
v Maxtor	www.maxtor.com	
v Sandisk	www.sandisk.com	
v Hitachi	www.hitachi.com	
v Netmos	www.netmos.com	
v Compact Flash Group	www.compactflash.org	

All of these chips are subject to change as cost and technology changes take place. It is IBM's intention to keep BIOS and I/O driver interfaces compatible where it is possible and technology allows it. Applications that write directly to hardware are not guaranteed to work with all versions of the hardware over time.

Installation of driver and BIOS updates to resolve problems is a customer responsibility.

Migration/Installation

This is a new product and other than standard PC compatibility, there is no migration plan from other IBM POS units to the 4810.

Technical support staffs at customers and business partners are expected to setup and maintain the 4810. It must be noted that significant networking and server skills are required in order to develop the proper boot images required to load the terminal from a server, if the terminal is used as a medialess device.

Software

The 4810 has a POST/BIOS subsystem provided by Phoenix Technologies, Ltd. The Power on self test (POST), BIOS, keyboard controller, and planar board architecture are documented in the book "System BIOS for IBM PC's, Compatibles, and EISA Computers; 2nd Edition", Phoenix Technologies, Ltd., Addison-Wesley Publishing Co, Inc., 1991, ISBN 0-201-57760-7. The systems do not support power on passwords, and the area in CMOS reserved for power on passwords has been used for configuration type information by POST and is not available for end user use.

The 4810 is tested and certified (as appropriate) with IBM PCDOS 2000, Red Hat Linux 7.1, Windows 98SE, NT4-SP6, 2000-SP2, and XP/XPe.   Additional testing in the IBM lab is performed using Microsoft Windows Hardware Compatibility test suites as well as DOS.

LAN and video drivers are tested with Red Hat Linux and Windows 98/NT/2000 and follow-ons. IBM utilizes these drivers "as is" from the component suppliers.

The 4810 includes RPL support by including in the system ROM a special version of Lanworks Technologies BOOTWARE RPL boot ROM. This RPL package can support IBM, Novell, and TCP/IP (DHCP bootp+ Intel PXE) RPL protocols.

Utility programs

The 4810 uses flash memory to store the system BIOS, video BIOS and the LAN boot ROM (RIPL). Flash memory has the advantage of permitting the firmware to be updated through software alone. Applying software updates to BIOS is a customer responsibility (just like the application of any other software fix) , and is not covered by the IBM warranty or the typical IBM maintenance agreement.

Distribution of software updates, utility programs, news tips, technical info, etc is via the IBM Retail page on the Internet. The address for the site is:

http://www.pc.ibm.com/store/

and follow the support links to the 4810 page.

All utility programs are DOS based. Diskette images that are DOS based and contain the utility programs must be RPLed into the terminal in order to use the utilities.

Many DOS utility programs are currently available on this site. Among them are:

- v CS4810 configuration program

    Normally the user initiates the BIOS setup during boot to set various terminal configuration values (such as boot source, RPL, etc.) These values can also be set via the use of the CS4810.EXE and CMOSSET.EXE programs. CS4810 is a program that can be run on any PC (under DOS) and can generate a file that contains setup information. This file is downloaded into a BART using the CMOSSET program. CMOSSET can be run from a server or from a DOS bootable diskette and it allows the SETUP values to be set without the use of SETUP, or requiring the use of a PC keyboard and video display at the POS terminal.

- v 4810PROG.COM can reprogram the flash memory system with a new version of BIOS contained in a disk file. The terminal must be able to boot DOS before this program can be used.

- v LAN drivers

- v RPL utilities

- v diagnostics

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Memory Map

The system BIOS includes all the function calls provided by an ISA PC. It is stored in a flash read only memory located on the planar board. Due to the increased amount of function in the base BIOS, the BIOS occupies much of the 64K segment between E000h and EFFFh (the specific amount varies between different BIOS versions**).**

The top 8K of the flash memory is being used as a "BOOT BLOCK" .The contents of this boot block cannot be changed once it is programmed during manufacturing. Any future BIOS update will not affect the contents of this boot block.

The BIOS level of a system is composed of:

- the level of the VGA BIOS (identified at cold boot);
- the level of the base system BIOS provided by Phoenix (identified via the phrase Phoenix BIOS Vx.xx)
- IBM extensions to BIOS identified in the phrase IBM POS Subsystem Version x.xx

Note that the overall level of the BIOS is determined by the value associated with the IBM extension level.

System configuration/setup

The 4810 contains a program within ROM called SETUP that allows for numerous options to be configured via a menu interface. Available options are different depending on model, features, and BIOS level. Use of this SETUP program requires the attachment of a PC compatible video display and keyboard. (An alternative to using SETUP at the terminal is to use the utility program CS4810 described in the *Utilities* section previously.)

I/O supported

The 4810 is formally tested or supported with the following I/O devices:

- v IBM SureMark POS printers (4610-1F6, TG3, TG4) (RS-232 attached)
- v IBM compact ANPOS keyboard
- v IBM 2x20 distributed character display
- v Cash drawers
    - 31x when attached to 4610 printer cash drawer port
    - 32x port 3, OPOS drivers required
- v many (but not all) USB floppy and CD ROM drives (there is not enough standardization to specify those drives that do not work);
- v IBM SurePoint analog VGA LCD displays (4820-4FD, 4FT, 1FD)
- v IBM VGA monitors
- v Industry standard PC keyboards, mice, and printers, etc.
- v Standard USB and RS-232 devices with appropriate drivers, software, OS, etc.

Technical specifications

RS-232 ports

The model 31x has 4 and the model 32x has 6 RS-232 ports. 2 ports are integrated within the south bridge of the chipset, and the additional ports are attached via dedicated PCI async controllers.
Un-Powered RS-232 ports follow the PC 9 pin standard:

- v TXD (transmit data, pin 3)
- v RXD (receive data, pin 2)
- v   (data set ready, pin 6)
- v DTR (data terminal ready, pin 4);
- v RTS (request to send, pin 7);
- v CTS (clear to send, pin 8);
- v CD (carrier detect, pin 1);
- v RI (ring indicate, pin 9);
- v Signal ground (pin 5);

These signals are implemented in a 15 pin female D connector.

Powered connector pinouts follow the Sureone (IBM 4614) standard
- v CD (carrier detect, pin 1);
- v RXD (receive data, pin 2)
- v TXD (transmit data, pin 3)
- v DTR (data terminal ready, pin 4)
- v DSR (data set ready, pin 12);
- v RTS (request to send, pin 13);
- v CTS (clear to send, pin 14);
- v RI (ring indicate, pin 15);
- v Signal ground (pin 5, 6, 11); +12V (+5%, -10% at the connector), (pins 8, 9)
- v Pins 7, 10
    - 31x models, reserved
    - 32x models, +5V (+5%, -10% at the connector) Note that the 4810 is designed to deliver a maximum of 1A at 12V and 1A at 5V to all I/O devices combined connected to the powered ports.

The terms "transmit" and "receive" as defined above are viewed from the terminal out to the attached device. (The terminal appears as data terminal equipment or a DTE as defined by the RS-232 specification).

All RS-232 ports are 16550 (FIFO) compatible.

Base PC ports are the non-powered ports, while the PCI ports are the powered ones. Drivers are available and required for the PCI ports.

Application developers should be aware of the following:
- **The PCI architecture prevents assigning the IRQ levels from these ports to different dedicated IRQ levels.**
- **Depending on the OS and the order of driver installation the letter designation for COM ports on the tailgate may not line up with the numerical designation assigned by the OS and drivers. Windows 2000 and Windows XP offer the ability to change the numerical designation of COM ports so they can be mapped to match the letter designation if desired.**

PC Printer port

All 31x models have a bi-directional parallel printer port capable of working in EPP, ECP or standard printer port mode.

Note: the 32x models do not have a PC printer port.

Programming Considerations

Identification via software

The 4810 provides a method by which software can detect specific levels of hardware and BIOS level.
:

Model (4810-)	Model ID string	Pointer to BIOS version**
	F000:E000h	
310	4BY	F000:E005h
320	4BW	F000:E005h

* indicates an ASCII string located at this memory location
* The "Pointer to BIOS version" is a pointer to an ASCII string that represents the BIOS level. It's a word in reverse Intel format that represents an offset within the F000 segment.

DMI

The 4810 supports the desktop management interface 2.0 specification. Details on this specification and how to use the data can be found at www.dmtf.org…the Desktop Management Task Force's website. .

Memory Map

The system memory map is as follows:

Address	Block
xxxxxxh	Open/RAM
100000h	
FFFFFh	64K POST/BIOS
F0000h	
EFFFFh	52K POST/BIOS
E3000h	
E2FFFh	12K Open
E0000h	
DFFFFh	16K POST/BIOS legacy USB if enabled, otherwise open
DC000h	
DBFFFh	62K Open
CC800h	
CC7FFh	2K LAN RPL
CCC00h	
CBFFFh	48K Video BIOS
C0000h	
BFFFFh	Video (128K)
A0000h	
9FFFFh	Base RAM (640K)
00000h	

Physical Characteristics

Mechanical

- **v** Width = 300 mm (11.8")
- **v** Depth = 216 mm (8.5")
- **v** Height = 90 mm (3.6")
- **v** Weight = 3.6 kg (8 lb.)

Cooling is provided via forced air cooling by a fan contained in the power supply. **Air vents must not be blocked and the vents must have 2" of clearance from cabinet walls, trash cans, papers, etc.**

Normal service access conditions for cable routing, attachment, etc. apply to the rear of the unit. The front of the unit must be accessible to the customer so that the power switch can be used.

Machine type/model, serial number, safety/regulatory labels, etc. are located on a label on the bottom of the unit.

Power Supply

Input Voltage   100-127V or 200-240Volts AC (switch selectable on rear)
Frequency   50-60 Hz, ±3 Hz.
Power consumption: 35W typical, 100W max.

AC Loads

None

DC Loads

In addition to the voltages required for the system unit to support the planar card, feature card and PS/2 kyb and mouse, +12V at 1A and +5V at 1A (total shared between both ports) is available for powering I/O devices through the powered RS-232 ports. Note the +5V on the powered RS-232 ports is a 32x model statement only. The amount of +5V available for PS2 keyboard and mouse ports is limited to 500mA total.

Standard USB ports are limited to the standard USB +5V load of 500mA each, with a combined total of 1A max.

Environmental

- v Gaseous- IBM Class G1
- v Particulate- IBM Class P1
- v Vibration and Shock- IBM Class V2
- v Acoustical Levels- IBM Class 2C

Temperature

- Operating - +10^{0}C to 40^{0}C with 8% to 80% relative Humidity. (IBM Class C..See IBM CES -1-9700-0000).
- Shipping - -40^{0}C to +60^{0}C including condensation but excluding rain.
- Storage - 0^{0}C to +60^{0}C.

Electromagnetic Compatibility (EMC)

- v EMI radiated/conducted (USA/Canada) - FCC/DOC Class A (reference C-S 2-0001-026)
- v EMI radiated (EMEA) - EC CE mark (meets CISPR-22-A emission limits)
- v EMI (conducted) (EMEA) - class B for HV and autoswitchers (Italian fiscal law requirement)
- v EMI radiated/conducted (Japan) - Japan VCCI class 1
- v EMI radiated/conducted (Korea) - Korea MOC Class A
- v ESD Class 2 (reference IBM C-S 2-0001-005)

Packaging

Packed in a single box.

Ancillary Products/Supplies

None

World Trade Considerations

The VGA subsystem is capable of supporting all country NLS requirements (including DBCS countries). This support requires NLS support from the operating system.

The VGA adapter is ISO 9241 compliant when used with an ISO compliant CRT and font/OS.

Appendix: Country list/power cords

North America

Country	Country Order Code	Voltage	Line cord (type, length) per C-B 2-4700-009
USA	N/A	Low	4 (1.8, 2.8, or 4.3m) 7 (1.8, or 4.3m)
Canada	649	Low	4 (4.3m)

Europe, Middle East, Africa

Country	Country Order Code	Voltage	Line cord (length, type)
Albania	603	High	18 (4.3m)
Austria	618	High	18 (4.3m)
Belgium	624	High	18 (4.3m)
Bosnia	699	High	18 (4.3m)
Bulgaria	644	High	18 (4.3m)
Croatia	704	High	18 (4.3m)
Czech Republic	668	High	18 (4.3m)
Denmark	678	High	19 (4.3m)
Egypt	865	High	18 (4.3m)
Finland	702	High	18 (4.3m)
France	706	High	18 (4.3m)
Germany	724	High	18 (4.3m)
Greece	726	High	18 (4.3m)
Hungary	740	High	18 (4.3m)
Iceland	742	High	18 (4.3m)
Ireland	754	High	23 (4.3m)
Israel	756	High	32 (4.3m)
Italy	758	High	25 (4.3m)
Macedonia	705	High	18 (4.3m)
Netherlands	788	High	18 (4.3m)
Norway	806	High	18 (4.3m)
Pakistan	868	High	18 (4.3m)
Poland	820	High	18 (4.3m)
Portugal	822	High	18 (4.3m)
Qatar	823	High	23 (4.3m)
Romania	826	High	18 (4.3m)
Russia	826	High	18 (4.3m)
Saudi Arabia	832	Low	4 (4.3m)
Serbia	707	High	18 (4.3m)
Slovakia	668	High	18 (4.3m)
Slovenia	708	High	18 (4.3m)
South Africa	864	High	22 (4.3m)
Spain	838	High	18 (4.3m)
Sweden	846	High	18 (4.3m)
Switzerland	848	High	24 (4.3m)
Turkey	862	High	18 (4.3m)

Country	Country Order Code	Voltage	Line cord (length, type)
U.K.	866	High	23 (4.3m)

Latin America

Country	Country Order Code	Voltage	Line cord (type, length)
Argentina	613	High	6 (4.3m)
Bahamas	619	Low	4 (4.3m)
Barbados	621	Low	4 (4.3m)
Bermuda	627	Low	4 (4.3m)
Bolivia	629	Low	4 (4.3m)
Brazil	631	Low	4 (4.3m)
Chile	655	High	25 (4.3m)
Colombia	661	Low	4 (4.3m)
Costa Rica	663	Low	4 (4.3m)
Dom Rep	681	Low	4 (4.3m)
El Salvador	829	Low	4 (4.3m)
Ecuador	683	Low	4 (4.3m)
Guatemala	731	Low	4 (4.3m)
Jamaica	759	Low	4 (4.3m)
Honduras	735	Low	4 (4.3m)
Mexico	781	Low	4 (4.3m)
Neth-Antilles	791	Low	4 (4.3m)
Panama	811	Low	4 (4.3m)
Paraguay	813	High	6 (4.3m)
Peru	815	High	4 (4.3m)
Trinidad	859	Low	4 (4.3m)
Uruguay	869	High	6 (4.3m)
Venezuela	871	Low	4 (4.3m)

Asia-Pacific

Country	Country Order Code	Voltage	Line cord (type, length)
Australia	616	High	6 (4.3m)
China (PRC)	672	High	6 (4.3m)
Hong Kong	738	High	23 (4.3m)
Japan	760	Low	4 (4.3m)
			20 (4.3m, black and white)
India	744	High	23 (4.3m)
Indonesia	749	High	18 (4.3m)
Malaysia	778	High	23 (4.3m)
New Zealand	796	High	6 (4.3m)
Philippines	818	High	4 (4.3m)
Sri Lanka	652	High	23 (4.3m)
Singapore	834	High	23 (4.3m)
Taiwan	858	Low	4 (4.3m)

Country	Country Order Code	Voltage	Line cord (type, length)
		High	7 (4.3m)
Thailand	856	High	5 (4.3m)