



Programming Guide

HP RP9 Retail Integrated 2x20 Display

HP ElitePOS 2x20 Display

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Table of Contents

Chapter 1 Introduction	2
1.1 Features	2
Chapter 2 General Specifications.....	3
2.1 LCD Panel Modules	3
2.1.1 LM940	3
2.1.2 TD620.....	3
2.2 Electricity	4
2.2.1 LM940	4
2.2.2 TD620.....	4
2.3 Overall Dimensions	4
2.3.1 LM940	4
2.3.2 TD620.....	4
2.4 Environment	4
2.5 Driver Interface	5
2.6 User Setting	5
2.6.1 Function Setting	5
Chapter 3 Command Description	7
3.1 Command Set.....	7
3.1.1 ULTIMATE Command Mode	7
3.1.2 UTC Standard Command Mode	9
3.1.3 UTC Enhance Command Mode	10
3.1.4 AEDEX Command Mode	10
3.1.5 ADM788 Command Mode	10
3.1.6 DSP800 Command Mode.....	11
3.1.7 CD5220 Command Mode.....	12
3.1.8 EMAX Command Mode	14
3.1.9 LOGIC Command Mode	15
3.1.10 Command Mode	16
Chapter 4 Character Set	18
4.1 U.S.A. / Standard Character Set (20h - 7Eh)	18
4.2 International Character Selection	18

Chapter 1 Introduction

1.1 Features

- **The customer display for the HP RP9 (LM940) model is a Liquid-Crystal Display (LCD) which has three kinds of display patterns.**
 1. 20 columns and 2 lines, each column is 16 x 16 dots.
 2. 10 columns and 1 line, each column is 32 x 32 dots.
 3. True Graphic Mode, which is 320 x 32 dots.
- **The customer display for the HP ElitePOS (TD620) model is a Thin-Film-Transistor Liquid-Crystal Display (TFT LCD) which has three kinds of display patterns.**
 1. Alphanumeric and Compound (2-Bytes) Words: 20 digits x 2 lines.
 2. 20 columns and 2 lines, each column is 24 x 32 dots.
 3. True Graphic Mode, which is 480 x 64 dots.
- **The LCD (LM940) blue-white fluorescent color is clear and easy-to-read.**
- **The TFT (TD960) has the capability to change the font or text color to any RGB colors.**
- **The interface of the customer display is USB with virtual RS-232 port, with selectable baud rate (default is 9,600 bps).**
- **The user defined and international character sets are the standard of the customer display.**
- **The customer display supports 10 command modes (default is ULTIMATE).**
- **The customer display gets powered from a USB port connection.**
- **Easy to configure various settings through multi-functional setup utility, which includes setting a Welcome Message, multiple code page settings, and other advanced settings.**
- **Specifically designed to prevent water or a wet counter surface from damaging the display from the bottom.**

Attention

1. This manual shall apply only to the product(s) in this manual.
2. This manual may not apply to the previous or later product(s).
3. This manual may be modified without any notice. For the latest manual go to www.hp.com/support.

Chapter 2 General Specifications

2.1 LCD Panel Modules

2.1.1 LM940

ITEM	STANDARD VALUE	UNIT
Number of dots	320 x 32 dot	---
Outline dimension	150 (L) x 34.9 (W) x 6.4	mm
View area	144.8 (L) x 22.44 (W)	mm
Active area	142.7 (L) x 19.82 (W)	mm
Dot size	0.446 (L) x 0.62 (W)	mm
Dot pitch	0.426 (L) x 0.6 (W)	mm
LCD type	STN Negative Transmissive (In LCD production, there can be a slight color difference. HP can only guarantee the same color in the same batch.)	
Drive Method	LCD Module : 1/64 Duty, 1/9 Bias	
LED Color	LED, White	
Controller IC	ST7586S-G4	

2.1.2 TD620

ITEM	STANDARD VALUE	UNIT
Number of dots	480 x 64 dot	---
Outline dimension	148.9 (W) x 29.1 (L) x 3.35 (H)	mm
View area	135.28 (W) x 19.0 (L)	mm
Active area	134.28 (W) x 18.0 (L)	mm
Dot size	0.279 (W) x 0.281 (H)	mm
Dot pitch	0.426 (L) x 0.6 (W)	mm
LCD type	a-Si TFT , Normally white, Transmissive type (In LCD production, there can be a slight color difference. HP can only guarantee the same color in the same batch.)	
Drive Method	LCD Module : 1/64 Duty, 1/9 Bias	
LED Color	LED, White	
Controller IC	ST7586S-G4	

2.2 Electricity

2.2.1 LM940

Central Control Unit	CPU : MB9BF306N ROM : 512K ROM RAM : 64K SRAM
Speed	CPU : 80 MHz
Connector	6Pin USB
Power Source	5V USB Power

2.2.2 TD620

Central Control Unit	CPU : LBCP1028A ROM : 128K ROM RAM : 64K SRAM
Speed	CPU : 80 MHz
Connector	6Pin USB
Power Source	5V USB Power

2.3 Overall Dimensions

2.3.1 LM940

Dimension	220 (W) x 101(H) x 69.2(D)
View direction	6 o'clock
Horizontal Rotation	Max 355°
Weight	Approximately 980 grams

2.3.2 TD620

Dimension	157.47 (W) x 34.47 (H) x 12.9 (D)
View direction	$\theta_L \Phi=180^\circ$ (9 o'clock) 70 degree $\theta_R \Phi=0^\circ$ (3 o'clock) 70 degree $\theta_T \Phi=90^\circ$ (12 o'clock) 50 degree $\theta_B \Phi=270^\circ$ (6 o'clock) 70 degree
Weight	Approximately 110 grams

2.4 Environment

Operating Temperature	+10°C to +40°C
Storage Temperature	-10°C to +50°C
Relative Humidity	0% to 90% RH

2.5 Driver Interface

Interface	USB
-----------	-----

2.6 User Setting

The default protocol of the virtual RS232 port is 9600 bps, non-parity, 8 data bits, 1 stop bit with DTR/DSR control.

2.6.1 Function Setting

No switch, all user settings are set up by the Application Program (AP).

(I) Baud Rate Select

Function Description	Baud Rate (bps)
	9600
	19200

(II) Command Type Select

Function Description Software Defined
Command Type Hex Code

Mode Type	Hex
ULTIMATE (default)	00
UTC Standard	02
UTC Enhance	03
AEDEX	04
ADM788	05
DSP800	06
CD5220	07
EMAX	08
LOGIC CONTROL	09
LD540	0A

(III) Codepage List

FIRMWARE 1.58.2						
Dec	Hex	Codepage		Dec	Hex	Codepage
0	0x00	CP437		34	0x22	CP855
1	0x01	Katakana		35	0x23	CP861
2	0x02	CP850		36	0x24	CP862
3	0x03	CP860		37	0x25	CP864
4	0x04	CP863		38	0x26	CP869
5	0x05	CP865		45	0x2D	CP1250
11	0x0B	CP851		46	0x2E	CP1251
12	0x0C	CP853		47	0x2F	CP1253
13	0x0D	CP857		48	0x30	CP1254
14	0x0E	CP737		49	0x31	CP1255
16	0x10	CP1252		50	0x32	CP1256
17	0x11	CP866		51	0x33	CP1257
18	0x12	CP852		52	0x34	CP1258
19	0x13	CP858		241	0xF1	CP950
20	0x14	CP874		242	0xF2	CP936
32	0x20	CP720		243	0xF3	CP949
33	0x21	CP775		244	0xF4	CP932

Chapter 3 Command Description

3.1 Command Set

3.1.1 ULTIMATE Command Mode

Command	Hex	Function Description
HT	09	Move cursor right
BS	08	Move cursor left
US LF	1F0A	Move cursor up
LF	0A	Move cursor down
US CR	1F 0D	Move cursor to right-most position
CR	0D	Move cursor to left-most position
HOM	0B	Move cursor to home position
US B	1F 42	Move cursor to bottom position
US \$ x y	1F 24 x y	Move cursor to specified position $1 \leq x(\text{column}) \leq 20 ; 1 \leq y(\text{row}) \leq 2$
US C n	1F 43 n	Select/cancel cursor display n=0, canceled ; n=1, selected
CLR	0C	Clear display screen
CAN	18	Clear cursor line
US X n	1F 58 n	Brightness adjustment $1 \leq n \leq 4$
US E n	1F 45 n	Blink display screen $0 \leq n \leq 255$ (n*50msec) ON / (n*50msec) OFF n= 0, blinking is canceled n=255, display is turned off
ESC @	1B 40	Initialize display
ESC t n	1B 74 n	Select character code table
ESC R n	1B 52 n	Select international character set
US r n	1F 72 n	Select/cancel reverse character n=0, canceled ; n=1, selected
US MD1	1F 01	Specify overwrite mode
US MD2	1F 02	Specify vertical scroll mode
US MD3	1F 03	Specify horizontal scroll mode
ESC & s n m [a(pl..p5)] (m-n+1)	1B 26 s n m [a(pl..p5)](m-n+1)	Define download characters s=1 ; $32 \leq n \leq m \leq 126$; a=5 (p1..p5 = pattern1..pattern5)
ESC ? n	1B 3F n	Cancel user-defined characters $32 \leq n \leq 126$ (n=character code)
ESC % n	1B 25 n	Select/cancel download character set n=0, canceled ; n=1, selected
ESC W n s (x1 y1 x2 y2)	1B 57 n s (x1 y1 x2 y2)	Specify/cancel the window range n=1,2,3,4 (four windows) ; s=0,1 (disable, enable) $1 \leq x1 \leq x2 \leq 20$ (column) ; $1 \leq y1 \leq y2 \leq 2$ (row)
ESC = n	1B 3D n	Select peripheral device n=1, printer ; n=2, display ; n=3, printer & display

US :	1F3A	Set starting/ending position of macro definition
US ^ n m	1F 5E n m	Execute and quit macro $0 \leq (n,m) \leq 255$ n: specifies the time interval for display of characters in units of [n* 50msec] m: specifies the interval of macro execution every [m*50msec]
US @	1F 40	Execute self-test
US T h m	1F 54 h m	Display time : $0 \leq h \leq 23$; $0 \leq m \leq 59$
ESC % n	1B 25 n	Select/cancel download character set n=0, canceled ; n=1, selected
ESC W n s (x1 y1 x2 y2)	1B 57 n s (x1 y1 x2 y2)	Specify/cancel the window range n=1,2,3,4 (four windows) ; s=0,1 (disable, enable) $1 \leq x1 \leq x2 \leq 20$ (column) ; $1 \leq y1 \leq y2 \leq 2$ (row)
ESC = n	1B 3D n	Select peripheral device n=1, printer ; n=2, display ; n=3, printer & display
US :	1F3A	Set starting/ending position of macro definition
US ^ n m	1F 5E n m	Execute and quit macro $0 \leq (n,m) \leq 255$ n: specifies the time interval for display of characters in units of [n* 50msec] m: specifies the interval of macro execution every [m*50msec]
US T h m	1F 54 h m	Display time $0 \leq h \leq 23$; $0 \leq m \leq 59$
US U	1F 55	Display of time counter
ESC u A..CR	1B 75 41 [data x 20] 0D	Upper line display
ESC u B..CR	1B 75 42 [data x 20] 0D	Bottom line display
ESC u D..CR	1B 75 44 [data x 45] 0D	Upper line message scroll continuously
ESC u E..CR	1B 75 45 hh ':' mm 0D	Set and display 24 hour time $0 \leq h, m \leq 9$
ESC u F..CR	1B 75 46 [data x 45] 0D	Upper line message scroll once pass
ESC u 1..CR	1B 75 49 [data x 40] 0D	Two line display
ESC [D	1B 5B 44	Move cursor left
ESC [C	1B 5B 43	Move cursor right
ESC [A	1B 5B 41	Move cursor up
ESC [B	1B 5B 42	Move cursor down
ESC [H	1B 5B 48	Move cursor to home position
ESC [L	1B 5B 4C	Move cursor to left-most position
ESC [R	1B 5B 52	Move cursor to right-most position
ESC [K	1B 5B 4B	Move cursor to bottom position
ESC I x y	1B 6C x y $1 \leq x \leq 20, y = 1,2$	Move cursor to specified position

* International Character Set Table

Firmware 1.58.2

0x00	USA
0x01	France
0x02	Germany
0x03	U.K.
0x04	Denmark I
0x05	Sweden
0x06	Italy
0x07	Spain I
0x08	Japan
0x09	Norway
0x0A	Denmark II
0x0B	Spain II
0x0C	Latin America
0x0D	Korea
0x0E	Slovenia/Croatia
0x0F	China
0x10	Vietnam
0x11	Arabia

3.1.2 UTC Standard Command Mode

Command	Hex	Function Description
BS	08	Back space
HT	09	Horizontal tab
LF	0A	Line feed
CR	0D	Carriage return
DC0 p	10 p	Move cursor to specified position, $0 \leq p \leq 39$ (refer Row Character Position Chart)
DC1	11	Over write display mode
DC2	12	Vertical scroll mode
DC3	13	Cursor on
DC4	14	Cursor off
ESC d	1B 64	Change to UTC enhanced mode
US	1F	Clear display

Row Character Position Chart (Decimal)

Row1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Row2	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39

Row Character Position Chart (Hex)

Row1	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13
Row2	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	20	21	22	23	24	25	26	27

3.1.3 UTC Enhance Command Mode

Command	Hex	Function Description
ESC u A..CR	1B 75 41 [data x 20] 0D	Upper line display
ESC u B..CR	1B 75 42 [data x 20] 0D	Bottom line display
ESC u D..CR	1B 75 44 [data x 45] 0D	Upper line message scroll continuously
ESC u E..CR	1B 75 45 hh ':' mm 0D	Set and display 24 hour time $0 \leq h, m \leq 9$
ESC u F..CR	1B 75 46 [data x 45] 0D	Upper line message scroll once pass
ESC u H..CR	1B 75 48 n m 0D	Change attention code $32 \leq n, m$ (Default attention code $n=1Bh, m=75h$)
ESC u 1..CR	1B 75 49 [data x 40] 0D	Two line display
ESC RS..CR	1B 0F 0D	Change to UTC standard mode

3.1.4 AEDEX Command Mode

Command	Hex	Function Description
! # 1..CR	21 23 31 [data x 20] 0D	Upper line display
! # 2..CR	21 23 32 [data x 20] 0D	Bottom line display
! # 4..CR	21 23 34 [data x 45] 0D	Upper line message scroll continuously
! # 5..CR	21 23 35 hh ':' mm 0D	Set and display 24 hour time $0 \leq h, m \leq 9$
! # 5 CR	21 23 35 0D	Display 24 hour time
! # 6..CR	21 23 36 [data x 45] 0D	Upper line message scroll once pass
! # 8..CR	21 23 38 n m 0D	Change attention code $32 \leq n, m$ (Default attention code $n="!", m="#"$)
! # 9..CR	21 23 39 [data x 40] 0D	Two line display

3.1.5 ADM788 Command Mode

Command	Hex	Function Description
CLR	0C	Clear display
CR	0D	Carriage return
SLE1	0E	Clear up line and move cursor to upper line left most end
SLE2	0F	Clear low line and move cursor to lower line left most end
DC0	10 n	Set period to upper line last n position $1 \leq n \leq 7$
DC1	11 n	Set line blinking $n=1$, upper line $n=2$, lower line
DC2	12 n	Clear line blinking $n=1$, upper line $n=2$, lower line
SF1	1E	Clear field 1 and move cursor to field 1 fast position
SF2	1F	Clear field 2 and move cursor to field 2 fast position

3.1.6 DSP800 Command Mode

Command	Hex	Function Description
EOT SOH I n ETB	04 01 49 n 17	Select international character set
EOT SOH P n ETB	04 01 50 n 17	Move cursor to specified position $31 \leq n \leq 58$
EOT SOH C n m ETB	04 01 43 n m 17	Clear display range from <u>n</u> position to <u>m</u> position and move cursor to <u>n</u> position $31 \leq n \leq m \leq 58$
EOT SOH S n ETB	04 01 53 n 17	Save the current displaying data (40 characters) to n'th layer for demo display, $1 \leq n \leq 3$ (n specify the layer 1, 2, or 3)
EOT SOH D n m ETB	04 01 44 n m 17	Display the saved data $1 \leq n \leq 3$ (n specify the layer 1, 2, or 3) "m" can be ignored
EOT SOH A n ETB	04 01 41 n 17	Brightness adjustment $1 \leq n \leq 4$
EOT SOH = n ETB	04 01 3D n 17	Select peripheral device n=1, printer ; n=2, display
EOT SOH % ETB	04 01 25 17	Initialize display

* International Character Set Table

Firmware 1.58.2

Hex	Country
0x30	U.S.A.
0x31	FRANCE
0x32	GERMANY
0x33	U.K.
0x34	DENMARK I
0x35	SWEDEN
0x36	ITALY
0x37	SPAIN
0x38	JAPAN
0x39	NORWAY
0x3A	DENMARK II

3.1.7 CD5220 Command Mode

Command	Hex	Function Description
ESC DC1	1B 11	Overwrite mode
ESC DC2	1B 12	Vertical scroll mode
ESC DC3	1B 13	Horizontal scroll mode
ESC Q A CR	1B 51 41 [N]20 0D	Set string display mode, write string to upper line
ESC Q B CR	1B 51 42 [N]20 0D	Set string display mode, write string to lower line
ESC Q D CR	1B 51 44 [N]m20 0D	Upper line message scroll continuously m<40
ESC [D	1B 5B 44	Move cursor left
BS	08	Move cursor left
ESC [C	1B 5B 43	Move cursor right
HT	09	Move cursor right
ESC [A	1B 5B 41	Move cursor up
ESC [B	1B 5B 42	Move cursor down
LF	0A	Move cursor down
ESD [H	1B 5B 48	Move cursor to home position
HOM	0B	Move cursor to home position
ESC [L	1B 5B 4C	Move cursor to left-most position
CR	0D	Move cursor to left-most position
ESC [R	1B 5B 52	Move cursor to right-most position
ESC [K	1B 5B 4B	Move cursor to bottom position
ESC I x y	1B 6C x y	Move cursor to specified position 1≤x≤20 (column) ; y=1,2 (row)
ESC @	1B 40	Initialize display
ESC W s x1 x2 y	1B 57 s x1 x2 y	Enable or disable the window range at horizontal scroll mode s=0,1 (disable, enable) 1≤x1≤x2≤20 (column) ; y=1,2 (row)
CLR	0C	Clear display screen, and clear string mode
CAN	18	Clear cursor line, and clear string mode
ESC * n	1B 2A n	Brightness adjustment 1≤n≤4
ESC & s n m [a(pl..p5)] (m-n+1)	1B 26 s n m [a(pl..p5)] (m-n+1)	Define download characters s=1 ; 32≤n≤m≤126 ; a=5 (p1..p5 = pattern1..pattern5)
ESC ? n	1B 3F n	Delete download characters 32≤n≤126 (n=character code)
ESC % n	1B 25 n	Select / cancel download character set n=0, canceled ; n=1, selected
ESC _ n	1B 5F n	Set cursor ON/OFF n=0,1 (Off,On)
ESC f n	1B 66 n	Select international fonts set
ESC c n	1B 63 n	Select fonts, ASCII code or JIS code
ESC = n	1B 3D n	Select peripheral device n=1, printer ; n=2, display ; n=3, printer & display

(REMARK)

- * While using command “ESC Q A” or “ESC Q B”, these two commands could be used combining with terminal printer - TP 2688 or TP3688
- * If using command “ESC Q A” or “ESC Q B”, others commands can't be used except using command “CLR” or “CAN” to change operating mode
- * If using command “ESC Q D”, message on upper line will move continuously till receiving a new command, clearing upper line, and moving cursor to most left position on upper line

*** International Character Set Table**

Firmware 1.58.2

n		Country
Hex	Dec	
0x41	A	U.S.A.
0x46	F	France
0x47	G	Germany
0x55	U	U.K.
0x44	D	Denmark I
0x57	W	Sweden
0x49	I	Italy
0x53	S	Spain
0x4A	J	Japan
0x4E	N	Norway
0x45	E	Denmark II
0x4C	L	Slavonic
0x52	R	Russia

3.1.8 EMAX Command Mode

Command	Hex	Function Description
ESC DC1	1B 11	Overwrite mode
ESC DC2	1B 12	Vertical mode
ESC DC3	1B 13	Horizontal scroll mode
ESC [D	1B 5B 44	Move cursor left
BS	08	Move cursor left
ESC [C	1B 5B 43	Move cursor right
HT	09	Move cursor right
ESC [A	1B 5B 41	Move cursor up
ESC [B	1B 5B 42	Move cursor down
ESC [H	1B 5B 48	Move cursor to home position
HOM	0B	Move cursor to home position
ESC [L	1B 5B 4C	Move cursor to left-most position
CR	0D	Move cursor to left-most position
ESC [R	1B 5B 52	Move cursor to right-most position
ESC [K	1B 5B 4B	Move cursor to bottom position
ESC I x y	1B 6C x y $1 \leq x \leq 20, y = 1, 2$	Move cursor to specified position
ESC @	1B 40	Initialize display
CLR	0C	Clear display screen, and clear string mode
CAN	18	Clear cursor line, and clear string mode
ESC * n	1B 2A n $1 \leq n \leq 4$	Brightness mode
ESC _ n	1B 5F n $n = 0, 1$	Set cursor ON/OFF
ESC f n	1B 66 n	Select international fonts
ESC c n	1B 63 n	Select fonts, ASCII code or JIS code
ESC = n	1B 3D	Select peripheral device, display or printer n = 1; enable printer, disable display n = 2; disable printer, enable display n = 3; enable printer, enable display

3.1.9 LOGIC Command Mode

Command	Hex	Function Description
^Q	11	Overwrite mode
^R	12	Vertical mode
^I	09	Horizontal tab
^H	08	Back space
^J	0A	Line feed
^M	0D	Carriage return
^S	13	Cursor on
^T	14	Cursor off
^P	10	Digital select e.g.10 00 MSD of top row 10 13 LSD of top row 10 14 MSD of bottom row 10 27 LSD of bottom row
^_	1F	Reset
^D n	04 n	Brightness mode 04 FF – 100% Brightness mode 04 60 – 60% Brightness mode 04 40 – 40% Brightness mode 04 20 – 20% Brightness mode

3.1.10 Command Mode

Command	Hex	Function Description
HT	09	Move cursor right (only valid in overwrite mode)
BS	08	Move cursor left (only valid in overwrite mode)
CR	0D	Move cursor to the left-most position (only valid in overwrite mode)
ESC @	1B 40	Initialize customer display to initial state, clears display buffer, set display mode to shift and sets current display row to upper row
ESC U	1B 55	Select upper row as current row (initial default)
ESC D	1B 44	Select lower row as current row
ESC A n	1B 41 n	Sets customer display disable or enable n=D, Disable ; n=E, Enable
ESC C r c	1B 43 r c	Move cursor to specified position (only valid in overwrite mode) r = U, upper row ; r = D, lower row $1 \leq c \leq 20$ (column number)
ESC E r n	1B 45 r n	Set special effect or display mode of specified row
ESC R n	1B 52 n	Set international font sets
ESC = n	1B 3D n	Select peripheral n=1, printer ; n=2, display ; n=3, printer an display

(REMARK)*Using commands “ESC E r n”, the value (Hex) of parameter

- | | | | |
|---|---------------|---|---|
| r | 58h=all rows | n | special function, the value is one of |
| | 55h=upper row | | 30h=shift mode (default display mode) |
| | 44h=lower row | | 31h=rotation mode |
| | | | 32h=blink mode (only all rows) |
| | | | 33h=clear this row and switch to shift mode |
| | | | 34h=overwrite mode |
| | | | 35h=vertical mode |

* International Character Set Table

Firmware 1.58.2

Hex	Country
0x00	USA
0x01	France
0x02	Germany
0x03	U.K.
0x04	Denmark I
0x05	Sweden
0x06	Italy
0x07	Spain I
0x08	Japan
0x09	Norway
0x0A	Denmark II
0x0B	Spain II
0x0C	Latin America
0x0D	Korea
0x0E	Slovenia/Croatia
0x0F	China
0x10	Vietnam
0x11	Arabia

Chapter 4 Character Set

4.1 U.S.A. / Standard Character Set (20h - 7Eh)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
20h		!	"	#	\$	%	&	'	()	*	+	,	-	.	/
30h	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40h	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50h	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
60h	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70h	p	q	r	s	t	u	v	w	x	y	z	{		}	~	

4.2 International Character Selection

Country	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
USA	#	\$	@	[\]	^	`	{		}	~
France	#	\$	à	°	ç	§	^	`	é	ù	è	¨
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Russia	#	\$	@	[\]	^	`	{		}	~