

QWINT
SYSTEMS

PROGRAMMER REFERENCE MANUAL

**International
Personal
Communications
Terminals**
Publication PRM4-I



QWINT INTERNATIONAL PROGRAMMER REFERENCE MANUAL

INTERNATIONAL
KEYBOARD TERMINALS--
KSR-742, KSR-743, KSR-744, KSR-745
MSR-742, MSR-743, MSR-744, MSR-745

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IMPORTANT NOTICE
CONCERNING TELEPHONE SYSTEM CONNECTION REGULATIONS:

If your terminal is to be connected to the voice telephone network using the modular telephone jack (provided on 744 and 745 models with internal modem), please see Part 6 of this Manual regarding telephone authority notification.

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PART 1. INTRODUCTION

1.1 RELATION TO OTHER DOCUMENTS

This Programmer Reference Manual is designed to provide technical details on Qwint Personal Communications Terminals. It supplements the information in the User's Guide, which is intended for operators, who may not understand or need to know how to set up the terminal or program connecting equipment.

Please see the appropriate User's Guide for information on keyboard functions, paper and ribbons, editing, and sending and receiving messages.

A series of Easy Use Cards is also available to provide simplified step-by-step instructions for specific operator functions, such as memory editing.

Please see the Installation Instructions for information on installing your terminal.

1.2 MODELS COVERED

This Programmer Reference Manual applies to Qwint international keyboard terminals.

Figure 1.2.1 summarizes the principal features of the models covered by this manual.

QWINT INTERNATIONAL PROGRAMMER REFERENCE MANUAL

PART 1. INTRODUCTION (Cont'd)

1.2 MODELS COVERED (Cont'd)

FEATURE	MODEL							
	KSR-				MSR-			
	742-I	743-I	744-I	745-I	742-I	743-I	744-I	745-I
CCITT #5 KEYBOARD		YES	YES	YES		YES	YES	YES
CCITT #2 KEYBOARD	YES				YES			
EDIT KEYS	YES	YES	YES	YES	YES	YES	YES	YES
4K/16K EDITABLE MEMORY					YES	YES	YES	YES
INTERNAL MODEM			YES	YES			YES	YES
SWITCHED NETWORK			YES	YES			YES	YES
ACOUSTIC ADAPTER				YES				YES
RS-232 (V.24)	YES	YES	YES	YES	YES	YES	YES	YES
ANSWERBACK	YES	YES	YES	YES	YES	YES	YES	YES
CARRYING CASE				YES				YES

KSR = Keyboard Send/Receive.

MSR = Memory Send/Receive.

742 = CCITT #2 keyboard, RS-232 (V.24), no internal modem.

743 = CCITT #5 keyboard, RS-232 (V.24), no internal modem.

744 = CCITT #5 keyboard, internal modem, switched network, CCIT *

745 = 744 features plus acoustic adapter, carrying case.

FIGURE 1.2.1 PRINCIPAL FEATURES BY MODEL

Because this manual covers all these models, not every section will apply to each Qwint model.

PART 2. CONFIGURATION

2.1 KEYBOARD CONFIGURATION

Each Qwint keyboard model can be programmed for a specific mode of operation from the keyboard. The configuration is stored in nonvolatile memory, so after the machine is shut off, it will come back up in the same mode again when power is turned back on.

On machines with CCITT #5 keyboards, the three keys dedicated to keyboard configuration are STAT (status), PRG (program), and TST (test). Figure 2.1.1 shows the location of these keys on the keyboard. (U.S./U.K. keyboard layout shown.)



QM185

FIGURE 2.1.1 CONFIGURATION KEYS FOR CCITT #5 KEYBOARD LAYOUT

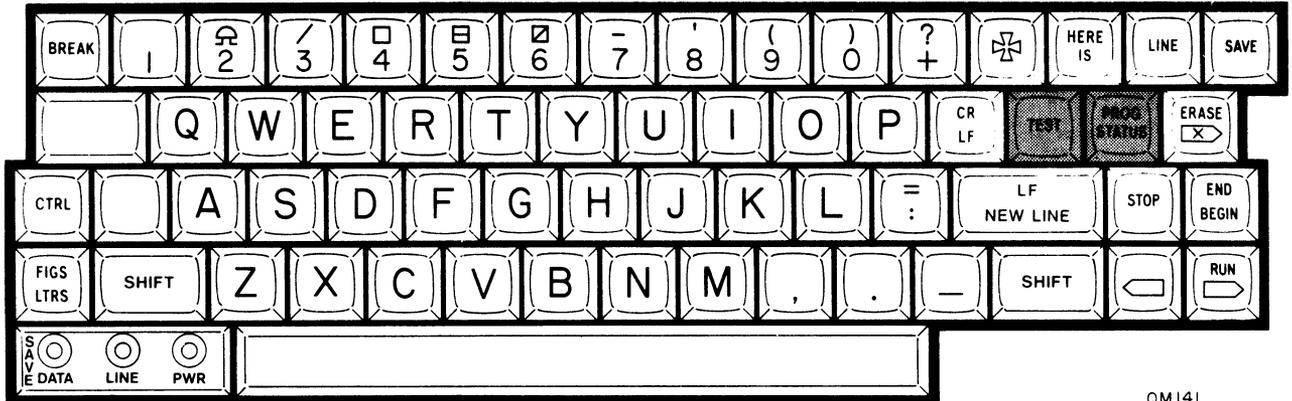
On machines with CCITT #2 keyboards, the configuration keys operate in the same basic way, but are differently positioned. Figure 2.1.2 shows the CCITT #2 keyboard arrangement. (QWERTY key arrangement shown.)

PRINT CURRENT STATUS: STAT KEY

Select the STATUS function by pressing the STAT key while holding down CTRL (CONTROL). The terminal must be off line. The terminal prints its current configuration.

To terminate the printout before it is complete, put the terminal on line by pressing the LINE key. Press LINE again to return to local mode.

PART 2. CONFIGURATION (Cont'd)



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FIGURE 2.1.2 CCITT #2 KEYBOARD LAYOUT

2.3 PROGRAM NEW STATUS: PRG KEY

Select the PROGRAM function by pressing the PRG key while holding down CTRL (CONTROL). The terminal must be off line.

The terminal prints its current status, feature by feature, as outlined in Figure 2.3.2.

The prompting sequence will not always include every option listed in Figure 2.3.2, because your previous choices may already have determined the answer. Also, 743 models will omit prompts related to the internal modem, and KSR models will omit prompts related to the editable memory buffer.

After each prompt, you should type one of the responses shown in Figure 2.3.1.

PART 2. CONFIGURATION (Cont'd)

2.3 PROGRAM NEW STATUS: PRG KEY (Cont'd)

USER TYPES	MEANING	TERMINAL RESPONSE
Y, or SPACE, or NEW LINE	YES	Leaves feature as shown. Proceeds to next feature.
N	NO	Reprompts user to enter correct value.
NUMBER+SPACE	NEW VALUE	Repeats prompt, with new value, for user to verify.
S	SKIP TO NEXT CATEGORY	Skips to next group of feature options.
U	UP TO TOP OF CATEGORY	Starts at top of this group of options. Or if already at top then go to the top of the prev- ious group of options.
Q	QUIT	Ends prompting sequence.

FIGURE 2.3.1 USER RESPONSES TO PROGRAM PROMPTING

When the prompting sequence is complete, the machine asks whether to store in memory. If you answer YES, this new status will be stored in nonvolatile memory. The machine pauses a few seconds, then finishes by ejecting the printout.

PART 2. CONFIGURATION (Cont'd)

2.3 PROGRAM NEW STATUS: PRG KEY (Cont'd)

Typing Options	PERMITTED OPTIONS
Print intensity is 4	0-15
LCV time = 15 deciseconds	1-127 [0 = no LCV]
Phone: 9;3124985069	Up to 16 digits
Dialing scheme uses 1-0.	1-0, 0-9, 0-1
Lines/inch = 6	4, 6, 8
Half lines/LF = 2.	2, 3, 4, 5, 6
Characters/inch = 12	10, 11, 12, 13, 15, 17, 20
Left margin = 0 characters	0 to 125 (DEPENDS ON
Line length = 83 characters	1 to 140 CHARS./IN.)
Printer Options	
On receipt of CR the printer will CR . . .	CR, CR LF
On receipt of LF the printer will CR LF. .	LF, CR LF
On receipt of VT the printer will SLEW 1" .	NL, SLEW 1"
On receipt of FF the printer will SLEW 2" .	NL, SLEW 2", FF TO MARKER, FF TO TOP OF PAGE
Keyboard Options	
Keyboard format = CCITT NO.5	CCITT NO.5, NO.2
Character set = UNITED KINGDOM (QWERTY). .	U.K., U.S., FINLAND, NORWAY/DENMARK, SWEDEN, GERMANY, FRANCE, FRENCH CANADA, ITALY, SPAIN U.S. UNIVERSAL, UNIVERSAL
New line key => CR LF.	CR, LF, CR LF, CR LF DEL
Communications Options	
Terminal connects through internal modem .	INTERNAL MODEM, V.24
Signal protocol is Bell 103	BELL 103, CCITT V.21
Baud Rate = 300.	45, 50, 57, 75, 100, 110, 150, 200, 225, 300, 450, 600, 1200
Serial data format is CCITT NO.5	CCITT NO.5, NO.2
Transmit parity is EVEN	EVEN, ODD, MARKING, SPACING
Data error detection is OFF.	ON, OFF
Local echo is ON	ON, OFF
Terminal = RD/TD ONLY	FULL V.24, RD/TD ONLY
Data IS paced with DC3/DC1	IS, IS NOT
Data IS NOT paced with CTS/SRTS	IS, IS NOT
SRTS means printer IS INVERTED . . .	IS, IS NOT
Data IS NOT paced with BREAK	IS, IS NOT
Data IS NOT transmitted at 6 CPS	IS, IS NOT
Character-initiated disconnect = EOT . .	NONE, EOT
Line IS shared with telephone	IS, IS NOT
Terminal IS captured by incoming call .	IS, IS NOT
Line captured on receipt of 4 rings	0-10
Printer IS NOT controlled by DC4/DC2 . .	IS, IS NOT

PART 2. CONFIGURATION (Cont'd)

Answerback Options

```
Answerback IS transmitted at connect
time. . . . . IS, IS NOT
Answerback = : Qwint MSR 10001 CR LF:. . . Up to 20 characters
```

FIGURE 2.3.2 PROGRAM MODE PROMPTING

2.4 PROGRAMMING THE ANSWERBACK

The ANSWERBACK is a memory buffer which transmits a short character sequence to identify this specific terminal. The answerback may be up to 20 characters long. The answerback is transmitted:

1. When the user types the HERE IS key on the keyboard (represented by a four-pointed star symbol, CTRL `).
2. When the connecting equipment sends the ASCII character ENQ (enquiry), or the equivalent Baudot WRU (who are you).
3. When the terminal answers a call (only if programmed to transmit at connect time).

The answerback is programmed as part of the regular PROGRAM prompting sequence, as shown near the bottom of Figure 2.3.2. However, to prevent inadvertent or unauthorized changes, the answerback prompting does NOT automatically appear. When the machine asks whether to store in nonvolatile memory, you must answer with CTRL Z. Then the answerback prompting takes place.

To enter the answerback, type the characters on the keyboard (up to 20). At the end of the sequence, type CTRL SPACE.

2.5 PROGRAM STATUS WHILE ON LINE: PSEUDO-LOCAL MODE

You may sometimes wish to change a machine feature when a call is already in progress. You could take the terminal off line, but that would disconnect the call. Instead you can enter PSEUDO-LOCAL mode, which allows you to perform local functions using the keyboard and printer, but without disconnecting the call in progress. Pseudo-local mode may for example be used to enter PROGRAM mode or to enter escape sequences to change the character font.

Characters generated while the machine is in pseudo-local mode are not sent out on line. The machine appears to be on line (but idle) to the connecting equipment. The green LINE lamp flashes steadily to indicate pseudo-local mode.

To leave pseudo-local mode and go back on line, type the LINE key.

PART 2. CONFIGURATION (Cont'd)

2.5 PROGRAM STATUS WHILE ON LINE: PSEUDO-LOCAL MODE (Cont'd)

If permanent status changes are required while on line, you may select the PROGRAM mode while on line. Press the PRG key while holding down the CTRL (control) key. This entry starts the normal prompt sequence, without sending it out on the line. You may quit and store status in the usual manner. Afterwards the terminal will be on line as before.

2.6 TEST MODE

The terminal TEST function puts the machine in TEST mode when the terminal is off line. This function performs diagnostic tests and may also be used to program a basic communications option.

1. While holding down the CTRL (control) key, press TST (test).
2. The terminal prints: "TEST?"
3. Type the number of the desired test, followed by a SPACE or NEW LINE.
4. The terminal performs the selected test.

TEST 0 prints a directory of the tests available. This directory is different for various terminal models, and is subject to change. A typical directory is shown in Figure 2.6.1.

PART 2. CONFIGURATION (Cont'd)

2.6 TEST MODE (Cont'd)

List of tests	
TEST 1	DUMP STATUS
TEST 2	PROGRAM STATUS
TEST 3	TEXT RAM TEST (WARNING: ERASES MEMORY BUFFERS)
TEST 4	DUMP STATUS CONT.
TEST 5	DUMP STATUS CONT. WITH PARTIAL LFs
TEST 6	LOOP BACK KEYBOARD-PRINTER AND UART-UART
TEST 7	SET TO SWITCHED NETWORK TIMESHARE
TEST 8	EXTERNAL V.21 MODEM
TEST 9	UNASSIGNED
TEST 10	UNASSIGNED
TEST 11	UNASSIGNED
TEST 12	UNASSIGNED
TEST 13	SET TO STORE/FORWARD SWITCHED NETWORK
TEST 14	SET FOR SWITCHED NETWORK TELEX @ 110
TEST 15	SET FOR SWITCHED NETWORK TELEX @ 300
TEST 16	SET TO V.24 DIRECT 1200 BAUD

FIGURE 2.6.1 AVAILABLE TEST FUNCTIONS

TEST 1 is equivalent to the STAT (status) function. TEST 2 is equivalent to the PRG (program) function.

2.7 TRANSMIT STATUS TO CONNECTING EQUIPMENT

When on line, and in CCITT #5 communications mode, the terminal will transmit its current status upon receipt of the following character sequence:

ESC [! p

(where ESC is the CCITT #5 escape character). The status report will be in the same format as though the machine were off line and the user pressed <CTRL+STAT> at the keyboard.

2.8 PROGRAM STATUS AND TEST FROM CONNECTING EQUIPMENT

When on line, and in CCITT #5 mode, the terminal will enter PROGRAM MODE upon receipt of the escape sequence:

ESC [" p

and can then be reconfigured by the connecting equipment. Use the following escape sequence to enter TEST mode:

ESC [# p

The terminal will transmit feature prompts, and await responses from the connecting equipment, just as though the machine were off line and the user were at the keyboard. When programming status remotely, pad out the answerback to its full capacity of 20 characters, using spaces or NUL characters. If the unit changing the configuration of the Qwint terminal is also a Qwint terminal, then that terminal must be configured for full duplex operation.

PART 2. CONFIGURATION (Cont'd)

2.9 TEMPORARY STATUS CHANGES: CCITT #5 ESCAPE SEQUENCE

In CCITT #5 mode, the terminal will temporarily modify typing, printing, and communications options on receipt of certain ESCAPE SEQUENCES. An escape sequence consists of the character ESC (escape), followed by one or more additional characters. The last character in the escape sequence is called the FINAL character; there may also be one or more INTERMEDIATE characters in the sequence.

Escape sequences which control character density (number of characters per inch) are shown in Figure 2.9.1.

The escape sequences in Figure 2.9.1 affect character densities for graphics sets G0 and G1. (See discussion in Sec. 3.5). The escape sequences in Figure 2.9.2 change the character density for the current graphics set, whether G0 or G1.

The sequences shown in Figure 2.9.3 temporarily change the national character set, allowing access to specialized characters found in various national character sets. (More information on character sets: Part 3.)

Escape sequences which control miscellaneous printing functions are shown in Figure 2.9.4.

Communications control escape sequences are shown in Figure 2.9.5. The memory buffer transmission escape sequences apply to MSR units only.

In local mode (terminal off line), an escape sequence is selected by typing the ESC key, followed by the remaining character(s) in the escape sequence. When the machine is on line, it will accept escape sequences as transmitted to it in ASCII code.

The machine does not permanently store changes made through use of escape sequences. When it is turned off, then on again, the machine returns to the configuration defined by the TEST and PROGRAM functions.

PART 2. CONFIGURATION (Cont'd)

2.9 TEMPORARY STATUS CHANGES: CCITT #5 ESCAPE SEQUENCE (Cont'd)

INTERMEDIATE CHARS.	FINAL CHAR.	FUNCTION
		INVOKE AS GRAPHICS SET G0..SHIFT IN (SI)
[10	w	-10 chars. per inch (CPI)
[11	w	-11 CPI
[12	w	-12 CPI
[13	w	-13 CPI
[14	w	-15 CPI
[15	w	-17 CPI
[16	w	-20 CPI
[24	w	-120 CPI/12 LPI GRAPH MODE
[17	w	-5.0 CPI (10 CPI expanded)
[18	w	-5.5 CPI (11 CPI expanded)
[19	w	-6.0 CPI (12 CPI expanded)
[20	w	-6.7 CPI (13 CPI expanded)
[21	w	-7.5 CPI (15 CPI expanded)
[22	w	-8.6 CPI (17 CPI expanded)
[23	w	-10.0 CPI (20 CPI expanded)
[25	w	-120 CPI/12 LPI EXPANDED GRAPH MODE
		INVOKE AS GRAPHICS SET G1..SHIFT OUT(SO)
[26	w	-10 chars. per inch
[27	w	-11 CPI
[28	w	-12 CPI
[29	w	-13 CPI
[30	w	-15 CPI
[31	w	-17 CPI
[32	w	-20 CPI
[40	w	-120 CPI/12 LPI GRAPH MODE
[33	w	-5.0 CPI (10 CPI expanded)
[34	w	-5.5 CPI (11 CPI expanded)
[35	w	-6.0 CPI (12 CPI expanded)
[36	w	-6.7 CPI (13 CPI expanded)
[37	w	-7.5 CPI (15 CPI expanded)
[38	w	-8.6 CPI (17 CPI expanded)
[39	w	-10.0 CPI (20 CPI expanded)
[41	w	-120 CPI/12 LPI EXPANDED GRAPH MODE

(SEE 3.5 ON GRAPHICS SETS G0 AND G1)
(SEE PART 8 ON GRAPH MODE)

FIGURE 2.9.1 CHARACTER DENSITY ESCAPE SEQUENCES

PART 2. CONFIGURATION (Cont'd)

2.9 TEMPORARY STATUS CHANGES: CCITT #5 ESCAPE SEQUENCE (Cont'd)

Sequences	Horizontal Pitch	Mode
ESC [0 w	10 CPI (char/inch)	Normal
ESC [1 w	11 CPI	Normal
ESC [2 w	12 CPI	Normal
ESC [3 w	13 CPI	Normal
ESC [4 w	17 CPI	Normal
ESC [5 w	5.0 CPI	Expanded
ESC [6 w	6.0 CPI	Expanded
ESC [7 w	6.7 CPI	Expanded
ESC [8 w	8.6 CPI	Expanded

FIGURE 2.9.2 SETTING HORIZONTAL PITCH FOR THE GRAPHICS SET IN USE

International Character Set	Sequence
United Kingdom	ESC (A
United States	ESC (B
Finland	ESC (C
Norway/Denmark	ESC (E
Sweden	ESC (H
Germany	ESC (K
France	ESC (R
French Canada	ESC (Q
Italy	ESC (Y
Spain	ESC (Z

FIGURE 2.9.3 SELECTING INTERNATIONAL USE CHARACTERS FOR THE G0 GRAPHICS SET

International Character Set	Sequence
United Kingdom	ESC) A
United States	ESC) B
Finland	ESC) C
Norway/Denmark	ESC) E
Sweden	ESC) H
Germany	ESC) K
France	ESC) R
French Canada	ESC) Q
Italy	ESC) Y
Spain	ESC) Z

FIGURE 2.9.3 SELECTING INTERNATIONAL USE CHARACTERS FOR THE G4 GRAPHICS SET

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PART 2. CONFIGURATION (Cont'd)

INTERMEDIATE CHARS.	FINAL CHAR.	FUNCTION
[+	s	Forward line space 1/48 inch
	M	Reverse LF
	L	Reverse line space 1/12 inch (superscript)
	K	Forward line space 1/12 inch (subscript)
[1	z	6 lines per inch mode
[2	z	8 lines per inch mode
[3	z	12 lines per inch mode
[4	z	4 lines per inch mode
[(	s	LH margin set
[)	s	RH margin set
[*	s	Clear margins

FIGURE 2.9.4 MISCELLANEOUS PRINTING FUNCTION ESCAPE SEQUENCES

INTERMEDIATE CHARS.	FINAL CHAR.	FUNCTION
	8	Full duplex mode (echo off)
	9	Half duplex mode (echo on)
	Z	Send back ESC + / - Q to identify as Qwint terminal
(	2	Start message programming
/	2	End one buffer message
)	2	Terminate buffer storage
*	2	Send back buffers, store in receiving terminal
+	2	Send back buffers, do not store in receiving terminal

(Sequences with final "2": MSR units only.)

FIGURE 2.9.5 COMMUNICATIONS CONTROL ESCAPE SEQUENCES

PART 3. CHARACTER SETS

3.1 CCITT #5 (ASCII) KEYBOARDS

Qwint international terminals may be furnished with either CCITT #2 (Baudot) or CCITT #5 (ASCII) keyboards.

The CCITT #5 code provides for a total of 128 characters. A number of character codes represent special national characters suitable for each nation's alphabet.

Therefore, substitute keycaps are necessary to adapt the Qwint CCITT #5 keyboard for many countries.

The CCITT #5 keyboard is factory stocked in the U.K. configuration. A quick-change keycap kit is available to modify to another specific national character set.

In a few cases, the positions of characters change. The English QWERTY arrangement becomes AZERTY for France and QWERTZ for Germany. The keycaps are exchanged in position.

The available CCITT #5 keyboard arrangements are shown in Appendix A.

3.2 CCITT #5 DATA CODE

CCITT #5 is a widely used code for communications between data terminals and computers. ASCII, the American Standard Code for Information Interchange, is the American version of the international code CCITT #5.

The 128 CCITT #5 characters include upper-case and lower-case letters, numbers, symbols, and control characters. The keyboard is capable of generating all 128 characters, and the terminal sends and receives all 128.

Figure 3.2.1 sets forth the U.S. ASCII version of the CCITT #5 code (ANSI Standard X.34-1977). Referring to Figure 3.2.1, the 7-bit code for a character is made up of the three column bits, followed by the four row bits. Example: the code for capital letter "Q" (column 5, row 1) is 1010001 in binary. In hexadecimal, the two-digit code is the column number (0 - 7) followed by the row number (where rows 10 through 15 are expressed as A - F). Capital "M" is 4D in hex.

QWINT INTERNATIONAL PROGRAMMER REFERENCE MANUAL

PART 3. CHARACTER SETS (Cont'd)

3.2 CCITT #5 DATA CODE (Cont'd)

		CONTROL		CHARACTERS							
		000	001	010	011	100	101	110	111		
		0	1	2	3	4	5	6	7		
0000	0	NUL	DLE	SP	0	@	P	~	p		
0001	1	SOH	DC1	!	1	A	Q	a	q		
0010	2	STX	DC2	"	2	B	R	b	r		
0011	3	ETX	DC3	#	3	C	S	c	s		
0100	4	EOT	DC4	\$	4	D	T	d	t		
0101	5	ENQ	NAK	%	5	E	U	e	u		
0110	6	ACK	SYN	&	6	F	V	f	v		
0111	7	BEL	ETB	'	7	G	W	g	w		
1000	8	BS	CAN	(	8	H	X	h	x		
1001	9	HT	EM	)	9	I	Y	i	y		
1010	10	LF	SUB	*	:	J	Z	j	z		
1011	11	VT	ESC	+	;	K	[	k	{		
1100	12	FF	FS	,	<	L	\	l	|		
1101	13	CR	GS	-	=	M	]	m	}		
1110	14	SO	RS	.	>	N	^	n	~		
1111	15	SI	US	/	?	O	_	o	DEL		

FIGURE 3.2.1 CCITT #5 CHARACTER CODES (U.S. ASCII)

PART 3. CHARACTER SETS (Cont'd)

3.3 INTERNATIONAL CCITT #5 CHARACTER SETS

When the machine is set up for a specific national character set, some of the codes shown in Figure 3.2.1 are replaced with characters suitable for that nation's alphabet. Charts showing character assignments appear in Appendix A below.

PART 3. CHARACTER SETS (Cont'd)

3.4 ASCII CONTROL CHARACTERS

Figure 3.4.1 gives the full name of each of the CCITT #5 control characters and shows what action, if any, is taken by the Qwint terminal in response to each character.

HEX	ASCII	FULL NAME	TERMINAL ACTION
00	NUL	Null	None
01	SOH	Start of Heading	None
02	STX	Start of Text	None
03	ETX	End of Text	Pause, transmit from memory
04	EOT	End of Transmission	Load stored configuration if optional disconnect selected
05	ENQ	Enquiry	Optional Answerback
06	ACK	Acknowledge	Restart memory pause
07	BEL	Bell	Ring bell (tone)
08	BS	Back Space	Space back one position
09	HT	Horizontal Tab	Space
0A	LF	Line Feed	Line feed (CR optional)
0B	VT	Vertical Tab	CR, slew 1 inch
0C	FF	Form Feed	CR, slew 2 inches, FF to marker, top page
0D	CR	Carriage Return	Move to left margin (line feed optional)
0E	SO	Shift Out	Enter Graphic Set G1
0F	SI	Shift In	Enter Graphic Set G0
10	DLE	Data Link Escape	None
11	DC1	Device Control 1	Data pacing or memory pause (proceed) (see 8.3)
12	DC2	Device Control 2	Receive ON (see 8.7)
13	DC3	Device Control 3	Data pacing or memory pause (wait) (see 8.3)
14	DC4	Device Control 4	Receive OFF (see 8.7)
15	NAK	Neg. Acknowledge	None
16	SYN	Synchronous Idle	None
17	ETB	End of Trans. Block	Pause, transmit from memory
18	CAN	Cancel	None
19	EM	End of Medium	None
1A	SUB	Substitute	None
1B	ESC	Escape	Initiates special control functions (see 2.9)
1C	FS	File Separator	None
1D	GS	Group Separator	None
1E	RS	Record Separator	None
1F	US	Unit Separator	None
7F	DEL	Delete	None

FIGURE 3.4.1 CCITT #5 CONTROL CHARACTERS

PART 3. CHARACTER SETS (Cont'd)

3.5 CCITT #5 GRAPHICS SETS

These terminals can print using a number of character densities. These densities range from 10 CPI (characters per inch) to 20 CPI in normal characters, and from 5.0 to 10.0 CPI using expanded characters. Expanded characters are formed by doubling each column of dots in the corresponding normal character set.

The terminal can be programmed using the PRG (program) function to any one of the normal character densities: 10, 11, 12, 13, 15, 17, or 20 CPI. The machine will come up printing in this density when power is turned on.

The terminal can also be temporarily shifted, using CCITT #5 escape sequences, to any of these normal densities, or to the expanded character densities. For the escape sequences, see Figure 2.9.1.

To fully explain the use of these escape sequences, we must introduce the two graphics sets, G0 and G1, and explain their use in conjunction with the two control characters SI (shift in) and SO (shift out).

At any moment, the printer prints from either one of the two graphics sets, G0 or G1. At power-up, the machine prints using G0. The CCITT #5 control character SO (shift out) will take the terminal to graphics set G1, while SI (shift in) returns the terminal to graphics set G0.

The escape sequences shown in Figure 2.9.1 effectively reprogram which character density will apply to each of the two graphics sets, G0 and G1.

An escape sequence does not shift the machine between G0 and G1; that is done by the SI and SO control characters.

Once escape sequences have reprogrammed G0 and G1, SO and SI can be used to shift between the two graphics sets.

Note that GRAPH MODE is available among the graphics set options. For details, see Part 8.

3.6 CCITT #2 (BAUDOT) KEYBOARDS

Qwint international terminals may also be provided with CCITT #2 (Baudot) keyboards.

The CCITT #2 code provides relatively fewer characters than does CCITT #5. Only three character positions are allocated to national characters suitable for each nation's alphabet: codes FIGS F, FIGS G, and FIGS H. On a Qwint CCITT #2 keyboard, these characters are symbolized by a box, a box with horizontal bar, and a box with a slash. These keys appear above the 4, 5, and 6

PART 3. CHARACTER SETS (Cont'd)

3.7 CCITT #2 DATA CODE (Cont'd)

Baudot is a five-level code. There are only 32 possible five-bit combinations, but Baudot extends this range with the LETTERS and FIGURES shift characters. In LETTERS mode, the first 26 codes shown in Figure 3.7.1 are interpreted as letters. In FIGURES mode, these codes are instead interpreted as the corresponding numerals and symbols. Older CCITT #2 equipment, including Telex machines, had manual LETTERS and FIGURES shift keys for shifting modes. These Qwint terminals provide automatic shifting, and insert FIGURES or LETTERS characters when logically required.

Appendix B includes a chart showing the characters that are printed for each character set option provided by these Qwint terminals.

3.8 RELATION OF CHARACTER CODE TO KEYBOARD

The terminal must be programmed to match its keyboard--either CCITT #2 or #5--using the PROGRAM function.

Then the machine is programmed for a specific national character set. The keycap layout should match the programmed character set to avoid operator confusion.

At this point, depressing a key will produce the corresponding printed character.

If the machine is programmed to communicate in CCITT #5 code, escape sequences (Figure 2.9.3) can be used to shift TEMPORARILY to another national character set. This is useful, for example, for printing foreign currency symbols.

However, when power is applied to the terminal after an idle period, the national character codes transmitted and printed will match the national character set selected for the keyboard.

Normally one will program the terminal to communicate in the same code (CCITT #2 or #5) as that selected for the keyboard. However, it is entirely possible to program a terminal with a CCITT #2 keyboard to communicate in CCITT #5 code, and vice versa. The terminal will automatically make the code conversion.

CCITT #2 keyboard characters can readily be translated to CCITT #5 communication codes because there is a CCITT #5 equivalent for each CCITT #2 code.

However, a CCITT #5 keyboard can generate characters for which there is no CCITT #2 code equivalent. Lower-case letters must be converted to upper-case. In addition, the characters shown in Figure 3.8.1 are discarded at transmission time because there is no equivalent.

PART 3. CHARACTER SETS (Cont'd)

3.8 RELATION OF CHARACTER CODE TO KEYBOARD (Cont'd)

! % * ~ ` ' { } @ [] \ ^ _

FIGURE 3.8.1 CCITT #5 CHARACTERS
DISCARDED IN CCITT #2 TRANSMISSION

PART 4. COMMUNICATIONS OPTIONS

4.1 SERIAL DATA TRANSMISSION

Qwint Personal Communications Terminals support serial data interfaces formatted as follows:

CCITT #5	TRANSMISSION: 7 bit CCITT #5 (ASCII) Parity even, odd, marking, or spacing (programmable) 1 stop bit (2 at 110 baud) RECEPTION: 7 bit CCITT #5 (ASCII) Parity bit present but ignored 1 stop bit (2 at 110 baud)
CCITT #2	5 bit CCITT #2 (Baudot) No parity 1.5 stop bits

4.2 FULL AND HALF DUPLEX (LOCAL ECHO MODE)

The terminal contains complete independent send and receive circuitry, supporting DUPLEX or two-way communications. It can be set up for HALF or FULL DUPLEX mode.

In FULL DUPLEX (FDX) mode, both the terminal and the connecting equipment can transmit and receive simultaneously when the terminal is on line. Characters typed on the keyboard are sent out on the line, but are not automatically printed on the typing unit. The Qwint terminal should be programmed for LOCAL ECHO OFF. Only characters received from the connecting equipment will be printed by the terminal. When the connecting equipment is a computer, it typically provides an ECHO option, whereby the computer immediately echoes each character generated by the keyboard, back to the terminal.

In HALF DUPLEX (HDX) mode, transmission takes place in either direction, but in only one direction at a time. Characters typed on the keyboard are automatically printed on the typing unit in HDX mode. The Qwint terminal is programmed for LOCAL ECHO ON. Characters are also sent out on line to the connecting equipment. The connecting equipment should not also be in echo mode, or characters will be printed twice at the terminal.

Selection of local echo on or off is normally made through the PRG (program) key. The following ASCII escape sequences can also be used:

ESC 8 = LOCAL ECHO OFF (FULL DUPLEX)
 ESC 9 = LOCAL ECHO ON (HALF DUPLEX)

PART 4. COMMUNICATIONS OPTIONS (Cont'd)

4.3 INTERFACE CHOICES

Qwint terminals offer the communications options shown below. (The model numbers that support each option are shown in parentheses.)

1. Direct connection to nearby computer. [Electrical interface, V.24 (RS-232). Connects using 25-pin "D" socket. Modem not used; dial-up not required.] (All models.)
2. Direct connect to switched network telephone line. [Modem interface. Connects using modular telephone line cord to telephone company RJ-11 jack. Dial-up using keyboard.] (744 and 745 models.)
3. Acoustic coupler connection to standard telephone line. [Acoustic cup adapter plugs into 25-pin "D" socket. Telephone handset fits into cups. Dial using telephone set.] (745 models.)

Selection of the proper interface is made using the TST (test) and PRG (program) key functions. Some option changes will also require new cable connections to the "D" connector or modular telephone jack.

QWINT INTERNATIONAL PROGRAMMER REFERENCE MANUAL

PART 5. ELECTRICAL INTERFACE

5.1 V.24 (RS-232) ELECTRICAL INTERFACE

The 25-pin "D" connector on the rear panel is compatible with CCITT Recommendation V.24 and U.S. Electrical Industries Association specification RS-232-C. This socket is used in direct connections to a nearby computer, or to an external modem.

The "D" connector includes signals for sending information (TD, TRANSMITTED DATA) and for receiving information (RD, RECEIVED DATA), along with common ground connections. Also included are signals which may be used to control the flow of serial data.

Figure 5.1.1 shows the signals on the 25-pin "D" connector that are dedicated to the RS-232 electrical interface. Figure 5.1.2 also shows these RS-232 signals, as well as signals used for the optional acoustic coupler.

On Qwint international models, the "D" connector is a male 25-pin plug (in conformance with V.24), requiring a female socket on the mating cable.

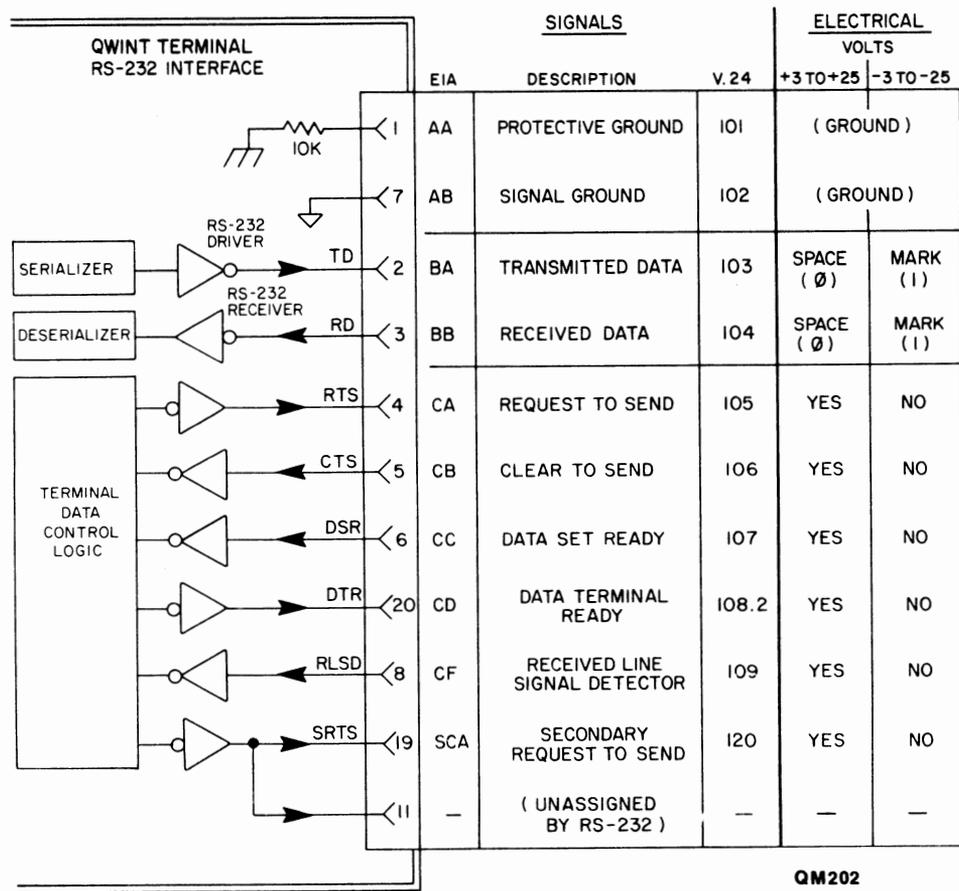


FIGURE 5.1.1 RS-232 INTERFACE SIGNALS

PART 5. ELECTRICAL INTERFACE

5.1 V.24 (RS-232) ELECTRICAL INTERFACE (Cont'd)

Either of two basic V.24 signal implementations may be selected:

RD/TD ONLY Only the RD and TD signals are active.

DTR, RTS, and SRTS signals are held high. DSR, CTS, and RLSD signals are ignored.

If data will be received faster than the printer throughput, data pacing through DC1/DC3 or BREAK will be required (see Part 7).

FULL V.24 All signals shown in Figure 5.1.1 are active.

DTR NOT READY (low) if off line.
 NOT READY if DSR high but EOT received.
 (See 7.6.)

DSR Must be READY (high) to send/receive.

RTS Same as DTR.

CTS Must be high to send.

RLSD Must be high to receive.

SRTS NOT READY (low) if off line.
 NOT READY if print buffer full.

Data pacing is available using the SRTS signal (see 7.2).

The maximum recommended distance between the Qwint terminal and connecting V.24 equipment is 50 feet (15 meters). Users may find that this distance can safely be extended, provided that the cable continues to meet V.24/RS-232 resistance and capacitance specifications, especially in an electrically noise-free environment and at lower communication speeds.

PART 5. ELECTRICAL INTERFACE (Cont'd)

TERMINAL PINS	SIGNAL DESCRIPTION
1	PROTECTIVE GROUND
2	TRANSMITTED DATA (TD)
3	RECEIVED DATA (RD)
4	REQUEST TO SEND (RTS)
5	CLEAR TO SEND (CTS)
6	DATA SET READY (DSR)
7	SIGNAL GROUND/COMMON RETURN
8	RECEIVED LINE SIGNAL DETECTOR (RLSD)
9	(RESERVED FOR TESTING)
10	120 OHMS, -14V SUPPLY
11	SECONDARY REQUEST TO SEND (SRTS)
12	FORCE ORIGINATE MODE FOR INTERNAL MODEM
13	FORCE ANSWER MODE FOR INTERNAL MODEM
14	SECONDARY TRANSMITTED DATA (STD)
15	(RESERVED)
16	RECEIVED DATA, INTERNAL MODEM
17	(RESERVED)
18	CLEAR TO SEND, INTERNAL MODEM
19	SECONDARY REQUEST TO SEND (SRTS)
20	DATA TERMINAL READY (DTR)
21	SPEAKER, ACOUSTIC INTERNAL MODEM
22	RING INDICATOR (RI)
23	MICROPHONE, ACOUSTIC INTERNAL MODEM
24	(RESERVED)
25	(RESERVED)

FIGURE 5.1.2 25-PIN "D" CONNECTOR SIGNALS

PART 6. DIRECT CONNECTION TO VOICE TELEPHONE NETWORK

6.1 FCC REGISTRATION (U.S. ONLY)

Models with an internal modem (744 and 745 series) can send and receive over ordinary voice-grade switched network telephone lines. The U.S. Federal Communications Commission (FCC) has established rules which permit this data modem to be directly connected to the voice telephone network, and this modem has been registered with the FCC. It is plugged into a standard modular jack, available from the telephone company. (Jacks for this type of customer-provided equipment are not available for party lines or coin lines.)

Within the United States, before connecting the data modem to the telephone network, you must provide the telephone company with the following information:

1. Your telephone number.
2. The FCC Registration Number: B4N8N9-68387-DM-R.
3. The Ringer Equivalence Number: 0.8B.
4. The USOC jack required: RJ11C or RJ16X for this modem. (The USOC RJ11C jack is the normal modular telephone jack using a miniature 6-pin plug and having two active pins.)

6.2 CONNECTION REGULATIONS OUTSIDE U.S.

The telephone authorities in each nation have established regulations concerning connection of terminals to the public switched telephone network. Generally, these rules are set up by the country's Post, Telephone, and Telegraph (PTT) authority.

Please contact your national Qwint representative for the current approval status of Qwint terminals before connecting equipment to the switched network.

6.3 SERVICE REQUIREMENTS

If the data modem malfunctions, it may cause harm to the telephone network. The device should be disconnected until the problem can be determined and until repair has been made. If this is not done, the telephone authority may temporarily disconnect service.

In the event of equipment failure, all repairs will be performed by Qwint Systems, Inc. or its authorized agent. It is your responsibility to report the need for service to Qwint Systems or to one of its authorized agents.

PART 6. DIRECT CONNECTION TO VOICE TELEPHONE NETWORK (Cont'd)

6.4 TELEPHONE DIRECT CONNECT SPECIFICATIONS

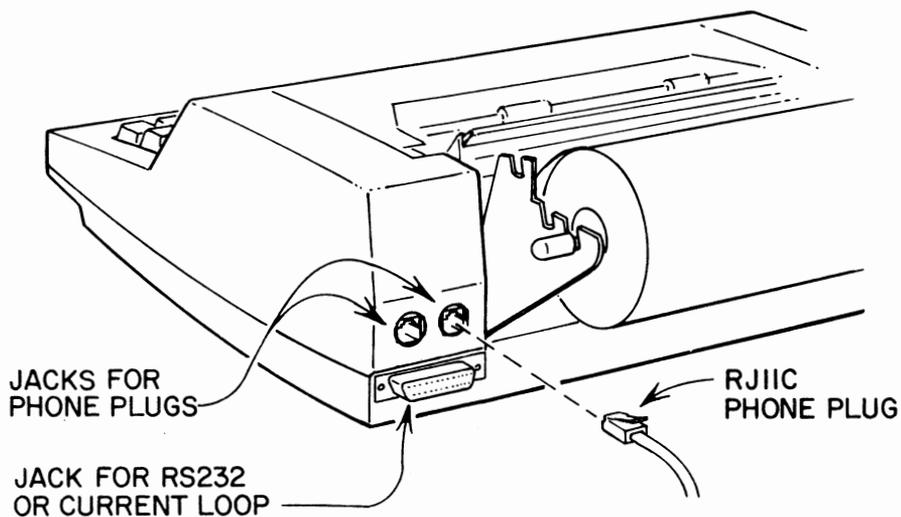
The specifications for direct connection to the voice telephone network are set forth in Figure 6.4.1.

CHARACTERISTIC	SPECIFICATION--DIRECT CONNECT TO TELEPHONE
TRANSMISSION MODE	Serial asynchronous, full or half duplex
CHARACTER CODES	CCITT #5 or CCITT #2
ELECTRICAL INTERFACE	Telephone Tip and Ring
MATING CONNECTOR	6-pin RJ11C Modular Plugs
COMMUNICATION SPEED	Bell 103 or CCITT V.21 style modem at 110/150/300 baud
THROUGHPUT	30 characters per second

FIGURE 6.4.1 TELEPHONE INTERFACE HIGHLIGHTS

6.5 RJ11C DIRECT CONNECT TO VOICE TELEPHONE

Two modular jacks are provided on the rear panel of the machine, just above the "D" connector. See Figure 6.5.1. The only signals utilized by the modem are the Ring and Tip signals. The six pin connector cable which comes with the terminal is designed to be plugged into the common six-pin modular jack.



QM129

FIGURE 6.5.1 CONNECTION TO RJ11C PLUG

PART 6. DIRECT CONNECTION TO VOICE TELEPHONE NETWORK (Cont'd)

6.6 ACOUSTIC COUPLER CONNECTION

The acoustic coupler allows coupling from a phone handset to the internal modem. The CUP-301 model manufactured by Qwint Systems is compatible only with International Qwint terminals with internal modems. The acoustic coupler module plugs into the "D" connector on the rear panel of the terminal. No connection should be made to the two RJ-11 jacks while the coupler is plugged in.

PART 7. PRINTER PACING AND CONTROL

7.1 PRINTER THROUGHPUT

The Qwint terminal supports a printing throughput of 30 characters per second.

When at the keyboard, an operator generates characters far slower than 30 cps. A 100 word-per-minute typist generates characters at 10 cps based on five-character words.

The terminal can normally print characters sent by connecting equipment at a 30 cps rate without any special measures to assure keeping up with the data stream. While the print mechanism returns the carrier to the left margin, after printing a line, the terminal's microprocessor stores incoming characters in its print buffer, which has a 256 character capacity. As the buffer fills, the terminal prints at a peak speed of 50 cps to achieve a 30 cps throughput.

When the terminal is programmed for V.24 (RS-232) interfaces at over 30 cps, data pacing will be required unless the printer will be expected to receive only short, infrequent messages. Methods of providing data pacing are discussed below.

7.2 DATA PACING WITH V.24 (RS-232) CONTROL SIGNALS

The terminal can receive long messages from connecting V.24 (RS-232) equipment at over 30 cps if data pacing is provided. Electrical handshaking via the RS-232 control signals is a commonly used data pacing method. When the terminal's character buffer is nearly full, it drops the RS-232 control signal SRTS. The connecting equipment must stop sending characters until the control signal is reasserted by the terminal.

If the connecting equipment is a computer connected directly to the printer, the interconnect cable should connect the terminal's SRTS signal to the computer's CTS signal. This allows the terminal to pace the data transmitted by the computer.

The usual mode for SRTS control is that when the signal is ON (+12 volts), the print buffer is ready to receive more characters. Some configurations require that the opposite meaning is implied by the SRTS lead. The PRG (program) function allows you to specify an inverted SRTS configuration where -12V (rather than +12V) means the printer "IS" or "IS NOT" ready.

PART 7. PRINTER PACING AND CONTROL (Cont'd)

7.3 DATA PACING WITH CCITT #5 CONTROL CHARACTERS

An alternate method of providing data pacing is to include selected CCITT #5 (ASCII) control characters in the data stream. No special hardware signals are required.

Qwint terminals provide this option through use of the two CCITT #5 control characters DC1 (DEVICE CONTROL 1) and DC3. See Figure 7.3.1. These characters were formerly called XON and XOFF and some connecting equipment documentation may use these names.

CONTROL CHARACTER		HEX	SENT BY	ACTION TAKEN BY RECEIVING EQUIPMENT
ASCII	ALT. NAME			
DC3	XOFF	13	QWINT	CONNECTING EQUIPMENT STOPS SENDING CHARACTERS
DC1	XON	11	QWINT	CONNECTING EQUIPMENT RESUMES SENDING CHARACTERS
DC3	XOFF	13	CONN. EQPT.	QWINT STOPS MEMORY TRANSMISSION
DC1	XON	11	CONN. EQPT.	QWINT RESTARTS MEMORY TRANSMISSION

FIGURE 7.3.1 SERIAL DATA CONTROL THROUGH DC1/DC3 CHARACTERS

7.4 HALTING DATA WITH BREAK

Qwint terminals support a BREAK data control method which may be used to halt data transmission.

A BREAK condition is caused when either the terminal or the connecting equipment puts its TRANSMITTED DATA (TD) line in the SPACE condition for an extended period. BREAK is not a CCITT #5 character, and in fact a BREAK condition violates the normal serial data format because the line is held in the SPACE condition for a period longer than an ordinary character time at the effective baud rate. The Qwint terminal generates a BREAK by holding the line in the SPACE condition for a period of 250 msec regardless of the effective baud rate. If so programmed, the terminal recognizes an incoming BREAK condition as a received NUL with an overrun error.

The terminal operator can generate a BREAK by pressing the BREAK key on the Qwint keyboard. The response of different types of connecting equipment to a BREAK will vary.

PART 7. PRINTER PACING AND CONTROL (Cont'd)

7.4 HALTING DATA WITH BREAK (Cont'd)

Provided that the terminal is an MSR model and has been configured to recognize a BREAK, it stops memory transmission upon receipt of a BREAK condition. No characters will be printed or transmitted. The keyboard continues to be enabled.

To resume sending from memory, the user must press the SHIFT and BREAK keys at the same time, or operate the RUN key.

Another way to unlock the memory is to press the LINE key, taking the terminal off-line. While in local mode, the memory will be unlocked. When the LINE key is pressed again, and the terminal goes back online, the memory will remain unlocked.

7.5 DATA PACING ERRORS

For transmission rates greater than 30 cps, some form of data pacing is usually required. Qwint terminals offer several pacing options, described above.

Data pacing errors will occur if:

1. The terminal is not programmed for the appropriate pacing.
2. The device which is transmitting data to the terminal is not set up properly.
3. The V.24 (RS-232) cable is not wired properly to carry the SRTS signal to the transmitting device.

If for any of these reasons the terminal receives so many characters that its buffer is about to overflow, then an error mode is entered. If the terminal has been set up for a character density less than 15 characters per inch, it will automatically shift to 15 characters per inch. The relatively compressed characters of the 15 cpi font will both notify the user that the pacing is not working properly, and also print the characters that are in the buffer more quickly in an attempt not to lose information. Although 15 cpi characters print about 50% faster than 10 cpi, there is no guarantee that the 15 cpi font will totally compensate for the lack of proper character pacing.

7.6 DISCONNECT OPTIONS

If so configured, the terminal will recognize transmission or reception of the ASCII control character EOT as a signal to terminate the connection. This feature is typically used in interfacing with modems. When configured for a modem, the terminal will automatically go off line when it receives EOT. When configured for interface to an external modem, the terminal will, upon receipt of EOT, remove DTR until the modem removes DSR. It will then reassert DTR.

PART 7. PRINTER PACING AND CONTROL (Cont'd)

7.7 PRINTER CONTROL WITH DC2 AND DC4

It is possible to have the printer copy only some of the messages received from connecting equipment. This feature is useful when both the printer and a video display terminal are connected to the same line, but only part of the message is intended for the printer.

To control the printer the operator should first configure the terminal for "Printer IS controlled by DC4/DC2." After this point every DC4 received from the line will disable the printing function until a DC2 is received. The next DC2 will restore normal printing. When first turned on the printer is normally enabled.

PART 8. GRAPH MODE

8.1 CAPABILITIES

In GRAPH MODE, the printer produces any desired pattern of dots on the page. GRAPH MODE is useful for graphs, charts, logos, or custom-designed characters. The printer must be in CCITT #5 communications mode for GRAPH MODE to operate.

Figure 8.1.1 provides basic facts for programmers on GRAPH MODE.

	NORMAL GRAPH MODE	EXPANDED GRAPH MODE
INVOKE AS G0 G1	ESC [24w ESC [40w	ESC [25w ESC [41w
VERTICAL RESOLUTION	1/60 IN.	1/60 IN.
HORIZ. RESOLUTION	1/120 IN.	1/120 IN.
COLUMNS PRINTED	EVERY	ODD OR EVEN

FIGURE 8.1.1 GRAPH MODE BASICS

8.2 GRAPH MODE DATA WORD TYPES

In GRAPH MODE, the printer accepts 7-bit data, as it does in the normal CCITT #5 mode. However, instead of interpreting each data word as a character, and printing that entire character, GRAPH MODE uses data words to print specific patterns of dots.

There are four types of GRAPH MODE data words, as shown in Figure 8.2.1.

GRAPH MODE DATA WORD TYPE	7-BIT CODE				
	7	6	5	4	3 2 1
DOT CODE	1	0	(5-DOT PATTERN)		
REPEAT	1	1	(NUMBER OF REPETITIONS)		
CONTROL	0	0	(ASCII CONTROL CHARACTERS)		
COLUMN CODE (EXPANDED MODE)	0	1	(EVEN/ODD COLUMN SELECT)		

FIGURE 8.2.1 TYPES OF GRAPH MODE DATA WORD

PART 8. GRAPH MODE (Cont'd)

8.2 GRAPH MODE DATA WORD TYPES (Cont'd)

1. DOT CODE--Printer prints the specific pattern of dots defined by the five low-order bits of the data word.
2. REPEAT CODE--Printer repeats the last DOT CODE. Number of repetitions is defined by the five low-order bits.
3. CONTROL CHARACTER--Printer performs the standard control functions, such as CR (carriage return), LF (line feed), etc.
4. COLUMN CODE--For EXPANDED GRAPH MODE, defines whether printer prints on even or odd columns.

All these data words are described in greater detail below.

8.3 VERTICAL DOT SPACING

In an ordinary character set, a full-sized character is seven dots high. The print wires on the COLLINEAR 7 print head are spaced 1/60 inch (0.42 mm) center-to-center. Each new line of characters is ordinarily spaced 1/6 inch center-to-center, or six lines per inch. Seven of every ten vertical dot positions are used for printing ordinary characters, and the other three are left blank as the space between lines. (See Figure 8.3.1.)

In GRAPH MODE, dots can be placed in all vertical positions, with no gap between lines. Dot patterns are printed in only five vertical dot positions at a time. Only the top five print needles are fired. Two passes of GRAPH MODE will cover all ten vertical dot positions covered by one line of ordinary characters, including the space before the next line of characters.

8.4 DOT CODE

A DOT CODE defines a dot pattern to be printed in a GRAPH MODE column of dots.

Bits 7 and 6 of the DOT CODE are always 1, 0. The remaining five bits determine the dot firing pattern for a column of five needles. See Figure 8.4.1.

As a guide to programmers, the chart in Figure 8.4.2 shows the 32 possible five-needle dot patterns; the hexadecimal DOT CODE which produces each pattern; and the equivalent U.S. ASCII character. When the printer is in GRAPH MODE it will print this dot pattern upon receipt of the designated U.S. ASCII character. In the chart, an asterisk (*) indicates the needle dot is printed, a "0" indicates no dot is printed.

PART 8. GRAPH MODE (Cont'd)

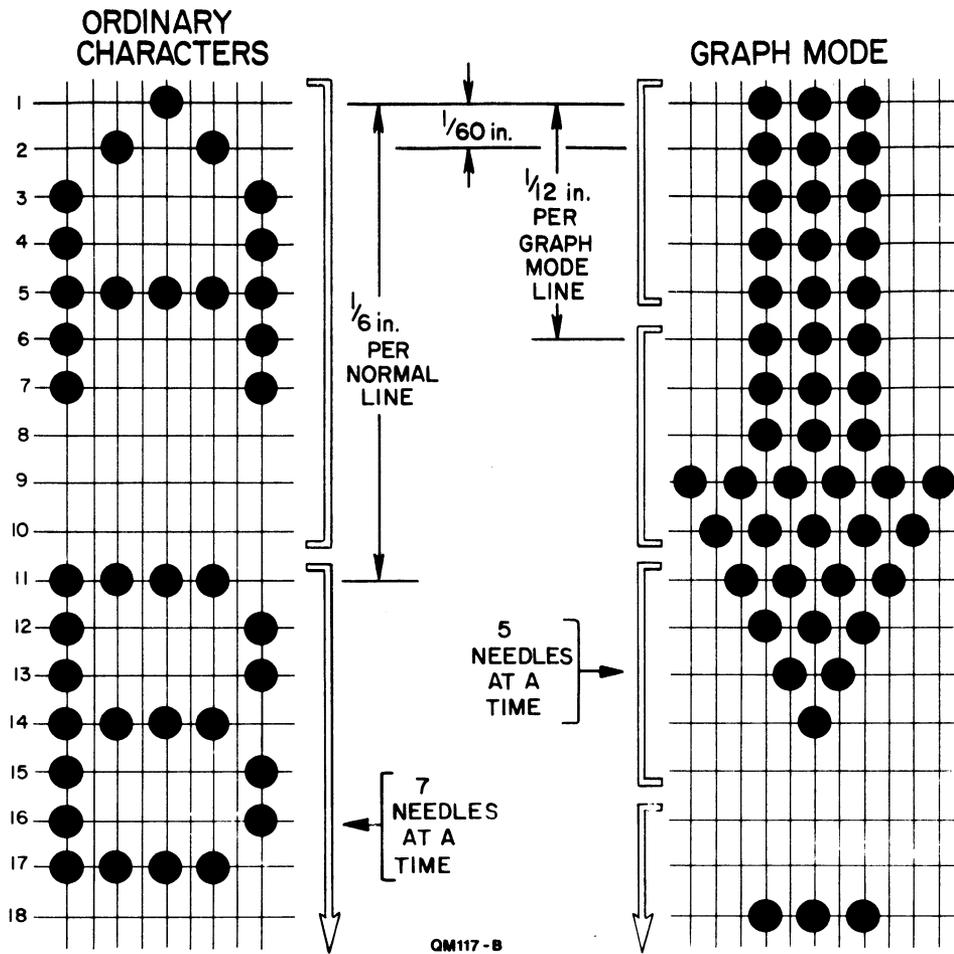


FIGURE 8.3.1 ORDINARY CHARACTERS VS. GRAPH MODE

PRINT HEAD NEEDLE	DOT CODE	
	BIT NO.	VALUE
1 (TOP)	1 (LSB)	1=PRINT DOT
2	2	0=NO DOT
3	3	
4	4	
5	5	
6 (NOT USED)	6	0
7 (NOT USED)	7	1

FIGURE 8.4.1 DOT CODE

PART 8. GRAPH MODE (Cont'd)

8.4 DOT CODE (Cont'd)

DOT HX ASC		DOT HX ASC		DOT HX ASC		DOT HX ASC	
O O O 40 @ O O	O O O 48 H * O	O O O 50 P O *	O O O 58 X * *				
* O O 41 A O O	* O O 49 I * O	* O O 51 Q O *	* O O 59 Y * *				
O * O 42 B O O	O * O 4A J * O	O * O 52 R O *	O * O 5A Z * *				
* * O 43 C O O	* * O 4B K * O	* * O 53 S O *	* * O 5B [* *				
O O * 44 D O O	O O * 4C L * O	O O * 54 T O *	O O * 5C \ * *				
* O * 45 E O O	* O * 4D M * O	* O * 55 U O *	* O * 5D] * *				
O * * 46 F O O	O * * 4E N * O	O * * 56 V O *	O * * 5E ^ * *				
* * * 47 G O O	* * * 4F O * O	* * * 57 W O *	* * * 5F _ * *				

FIGURE 8.4.2 5-NEEDLE DOT CODES

PART 8. GRAPH MODE (Cont'd)

8.5 ENTERING GRAPH MODE

Here is an example of how to center GRAPH MODE and print a series of dot patterns.

1. The terminal should be turned on, OFF LINE.
2. Type the following character sequence at the keyboard:

ESC [24w

The ESC (escape) key is the top left key on the keyboard. Make sure to use a lower case w. This key sequence programs character set G0 as NORMAL GRAPH MODE.

3. Type SI (Shift In), that is, <CTRL>+<O>, to be sure character set G0 is selected.
4. Type upper case "A" several times. The printer should print several dot columns with only the top needle present.
5. Now try the following capital letters:

A B D H P

These print one needle at a time, needles 1, 2, 3, 4, and 5 respectively.

6. For other needle patterns to try, see Figure 8.4.2.
7. To return to a normal character set, type the appropriate escape sequence. For example, ESC [10w programs graphics set G0 to ASCII at 10 characters per inch.

8.6 REPEAT CODE

A REPEAT CODE causes the last DOT CODE to be repeated a designated number of times. The REPEAT CODE helps condense GRAPH MODE character strings.

Bits 7 and 6 of the REPEAT CODE are always 1, 1. The remaining five bits are the number of repetitions in binary, from 1 to 31 repetitions.

A DOT CODE followed by a REPEAT CODE of 1100000 produces 59 repetitions. This prints one horizontal half-inch of the selected dot pattern in NORMAL GRAPH MODE, and one inch in EXPANDED GRAPH MODE. It is useful in large GRAPH MODE areas.

Figure 8.6.1 shows the number of repetitions, REPEAT CODES in hex, and equivalent ASCII (CCITT #5) characters (U.S. set).

PART 8. GRAPH MODE (Cont'd)

8.6 REPEAT CODE (Cont'd)

REP	HEX	ASC	REP	HEX	ASC	REP	HEX	ASC	REP	HEX	ASC
59	60	'	8	68	h	16	70	p	24	78	x
1	61	a	9	69	i	17	71	q	25	79	y
2	62	b	10	6A	j	18	72	r	26	7A	z
3	63	c	11	6B	k	19	73	s	27	7B	{
4	64	d	12	6C	l	20	74	t	28	7C	|
5	65	e	13	6D	m	21	75	u	29	7D	}
6	66	f	14	6E	n	22	76	v	30	7E	~
7	67	g	15	6F	o	23	77	w	31	7F	DEL

FIGURE 8.6.1 NUMBER OF REPETITIONS, REPEAT CODES IN HEX, AND EQUIVALENT ASCII CHARACTERS

Two or more REPEAT CODES may be used to produce any desired total number of repetitions. The REPEAT CODE does not affect the EXPANDED GRAPH MODE COLUMN CODE; the last stored COLUMN CODE will remain in effect.

8.7 CONTROL CHARACTERS

In GRAPH MODE, when bits 7 and 6 of a character are 0, 0, the 7-bit word is identified as an ASCII control character. In other words, the CCITT #5 control characters, in columns 0 and 1 of the code chart (Figure 3.2.1), have the same effect in GRAPH MODE as they would in a normal character set. EXCEPTIONS:

The LF (line feed) character produces a half-normal-size line feed in GRAPH MODE, for line spacing of 12 lines to a vertical inch on the page.

The escape sequence ESC m (reverse line feed) produces a half-normal-size reverse line feed in GRAPH MODE, moving the paper backwards 1/12 inch.

8.8 NORMAL OR EXPANDED GRAPH MODE

Two horizontal dot density options exist under GRAPH MODE.

1. NORMAL GRAPH MODE. The printer prints one column of dots for each data word received. Horizontal dot resolution, and horizontal dot density, are both 120 dots per inch.
2. EXPANDED GRAPH MODE. The printer uses each data word to produce two adjacent columns of dots. Each print head needle is assigned through a designated COLUMN CODE to print either on even columns, or on odd columns. While horizontal dot resolution remains 120 dots per inch, horizontal dot density is 60 dots per inch. EXPANDED GRAPH MODE provides reduction in data words used.

PART 8. GRAPH MODE (Cont'd)

8.9 COLUMN CODE (EXPANDED GRAPH MODE ONLY)

In EXPANDED GRAPH MODE, the COLUMN CODE assigns each needle to print either on odd-numbered columns, or even-numbered columns.

Bits 7 and 6 of the COLUMN CODE are always 0, 1. The remaining five bits assign the top five print needles to print on either odd or even columns. See Figure 8.9.1.

PRINT HEAD NEEDLE	COLUMN CODE	
	BIT NO.	VALUE
1 (TOP)	1 (LSB)	1=EVEN COLUMN 0=ODD COLUMN
2	2	
3	3	
4	4	
5	5	
6 (NOT USED)	6	1
7 (NOT USED)	7	0

FIGURE 8.9.1 COLUMN CODE

In EXPANDED GRAPH MODE, the user should first provide a COLUMN CODE with the desired odd/even needle column assignments. The printer will store this value. Then the user provides a series of DOT CODES. The odd/even alignment of the needles within these columns will be determined by the last provided COLUMN CODE. See Figure 8.9.2.

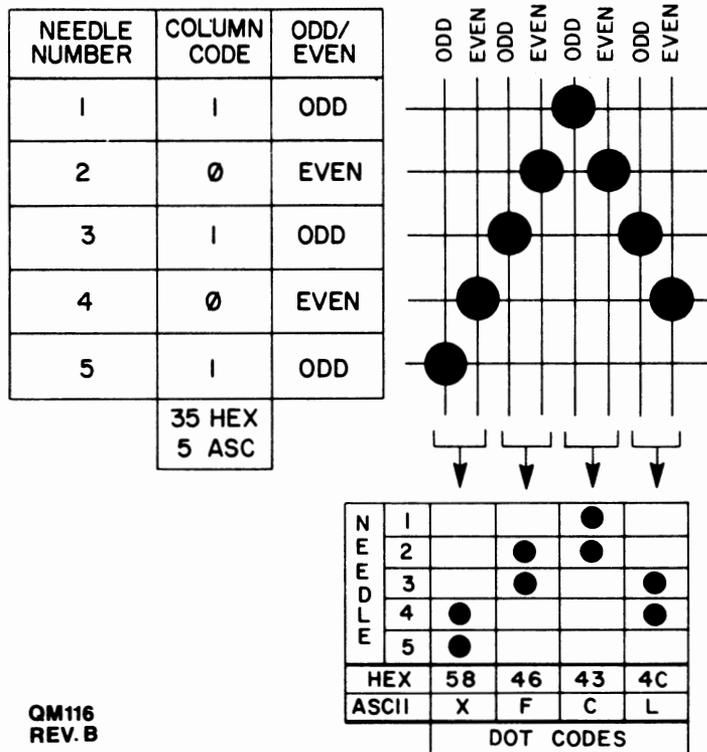
At power-up, the COLUMN CODE is initialized for all even columns. However, in case another GRAPH MODE sequence may have changed it, the proper COLUMN CODE should always be included at the beginning of every EXPANDED GRAPH MODE.

In NORMAL GRAPH MODE operation a COLUMN CODE specifying odd columns is illegal.

The COLUMN CODE may be included as often as necessary within an EXPANDED GRAPH MODE character string to reprogram odd/even column assignments.

Figure 8.9.3 shows the 32 COLUMN CODES, their hex values, and the equivalent ASCII characters. "O" indicates odd-numbered column, "E" indicates even-numbered column.

PART 8. GRAPH MODE (Cont'd)



QM116
REV. B

FIGURE 8.9.2 EXPANDED GRAPH MODE--
COLUMN CODE SETS ODD/EVEN COLUMNS;
DOT CODES PRINT SPECIFIC DOT PATTERNS

QWINT INTERNATIONAL PROGRAMMER REFERENCE MANUAL

PART 8. GRAPH MODE (Cont'd)

E	O	HEX	ASC	E	O	HEX	ASC	E	O	HEX	ASC	E	O	HEX	ASC
X	X	20	SP	X	X	28	(	X	X	30	0	X	X	38	8
X	X	21	!	X	X	29	)	X	X	31	1	X	X	39	9
X	X	22	"	X	X	2A	*	X	X	32	2	X	X	3A	:
X	X	23	#	X	X	2B	+	X	X	33	3	X	X	3B	;
X	X	24	\$	X	X	2C	,	X	X	34	4	X	X	3C	<
X	X	25	%	X	X	2D	-	X	X	35	5	X	X	3D	=
X	X	26	&	X	X	2E	.	X	X	36	6	X	X	3E	>
X	X	27	'	X	X	2F	/	X	X	37	7	X	X	3F	?

FIGURE 8.9.3 COLUMN CODES (EXPANDED GRAPH MODE)

PART 9. DIAGNOSTICS

9.1 INTERNAL DIAGNOSTICS

When power is applied to the terminal, it automatically performs tests on its internal electronic hardware. If the terminal fails these powerup diagnostics, the left-most lamp on the front panel will flash in a coded pattern. It flashes one or more times, pauses, and then repeats. The number of flashes in each sequence indicates the most likely problem, as shown in Figure 9.1.1.

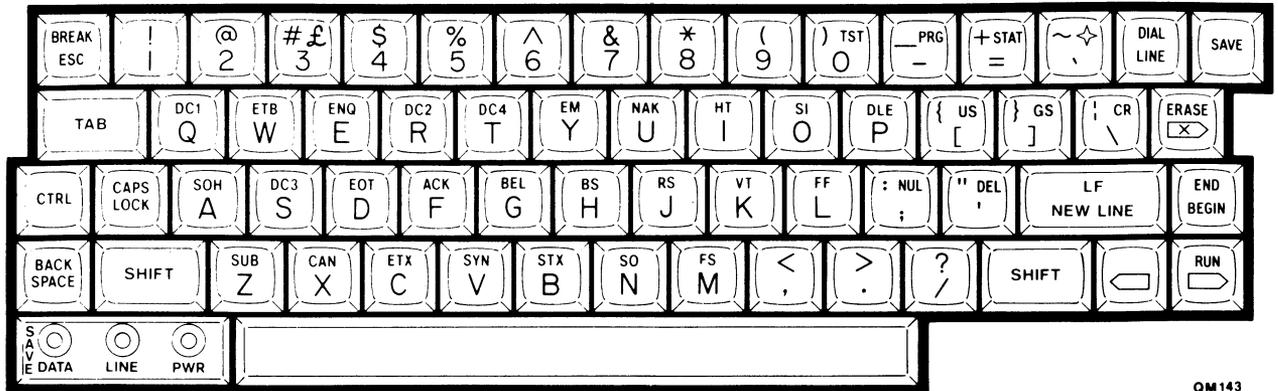
FLASHES	MEANING
1	First PROM has a bad checksum
2	First RAM is faulty
3	Second RAM is faulty
4	Second PROM has a bad checksum
5	System RAM is faulty
6	Memory module failure (-11 models)

FIGURE 9.1.1 DIAGNOSTIC ERROR CODES

You should not attempt to fix such problems, but should contact your distributor or the Qwint Systems Field Service Department.

QWINT INTERNATIONAL PROGRAMMER REFERENCE MANUAL

APPENDIX A. CCITT #5 KEYBOARDS AND CHARACTER CODES



QM143

				b7 →	0	0	0	0	1	1	1	1
				b6 →	0	0	1	1	0	0	1	1
				b5 →	0	1	0	1	0	1	0	1
b	b	b	b	COL	0	1	2	3	4	5	6	7
4	3	2	1	ROW	0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	DLE	SP	0	@	P	\	P
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	\$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10	LF	SUB	*	10	J	Z	j	z
1	0	1	1	11	VT	ESC	+	11	K	[	k	{
1	1	0	0	12	FF	FS	,	12	L	\	l	|
1	1	0	1	13	CR	GS	-	13	M	]	m	~
1	1	1	0	14	SO	RS	.	14	N	^	n	~
1	1	1	1	15	SI	US	/	15	O	_	o	DEL

QM153

FIGURE A-1. UNITED STATES ASCII (CCITT #5) KEYBOARD LAYOUT AND CHARACTER CODES

APPENDIX A. CCITT #5 KEYBOARDS AND CHARACTER CODES (Cont'd)



QM144

				b7 →	0	0	0	0	1	1	1	1
				b6 →	0	0	1	1	0	0	1	1
				b5 →	0	1	0	1	0	1	0	1
b	b	b	b	COL	0	1	2	3	4	5	6	7
4	3	2	1	ROW								
0	0	0	0	0	NUL	DLE	SP	0	⓪	P	\	P
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	&	3	C	S	c	s
0	1	0	0	4	EOT	DC4	\$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10	LF	SUB	*	:	J	Z	j	z
1	0	1	1	11	VT	ESC	+	;	K	[	k	{
1	1	0	0	12	FF	FS	,	<	L	\	l	|
1	1	0	1	13	CR	GS	-	=	M	]	m	}
1	1	1	0	14	SO	RS	.	>	N	^	n	~
1	1	1	1	15	SI	US	/	?	O	_	o	DEL

QM154

FIGURE A-2. UNITED KINGDOM CCITT #5 KEYBOARD LAYOUT AND CHARACTER CODES

QWINT INTERNATIONAL PROGRAMMER REFERENCE MANUAL

APPENDIX A. CCITT #5 KEYBOARDS AND CHARACTER CODES (Cont'd)



QM145A

				b7 →	0	0	0	0	1	1	1	1
				b6 →	0	0	1	1	0	0	1	1
				b5 →	0	0	1	0	1	0	1	1
b	b	b	b	COL	0	1	2	3	4	5	6	7
4	3	2	1	ROW	0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	DLE	SP	0	⓪	P	é	P
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	\$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10	LF	SUB	*	10	J	Z	j	z
1	0	1	1	11	VT	ESC	+	11	K	Ä	k	ä
1	1	0	0	12	FF	FS	,	12	L	Ö	l	ö
1	1	0	1	13	CR	GS	-	13	M	Å	m	å
1	1	1	0	14	SO	RS	.	14	N	Ü	n	ü
1	1	1	1	15	SI	US	/	15	O	—	o	DEL

QM155

FIGURE A-3. FINLAND CCITT #5 KEYBOARD LAYOUT AND CHARACTER CODES

APPENDIX A. CCITT #5 KEYBOARDS AND CHARACTER CODES (Cont'd)



QM266A

NORWAY



QM267A

DENMARK

b7 →	0	0	0	0	1	1	1	1		
b6 →	0	0	1	1	0	0	1	1		
b5 →	0	0	1	0	1	0	1	1		
b b b b 4 3 2 1	COL ↓	0	1	2	3	4	5	6	7	
0 0 0 0	ROW	0	NUL	DLE	SP	0	@	P	∖	P
0 0 0 1	1	SOH	DC1	!	1	A	Q	q	a	q
0 0 1 0	2	STX	DC2	"	2	B	R	r	b	r
0 0 1 1	3	ETX	DC3	#	3	C	S	s	c	s
0 1 0 0	4	EOT	DC4	\$	4	D	T	t	d	t
0 1 0 1	5	ENQ	NAK	%	5	E	U	u	e	u
0 1 1 0	6	ACK	SYN	&	6	F	V	v	f	v
0 1 1 1	7	BEL	ETB	'	7	G	W	w	g	w
1 0 0 0	8	BS	CAN	(	8	H	X	x	h	x
1 0 0 1	9	HT	EM	)	9	I	Y	y	i	y
1 0 1 0	10	LF	SUB	*	10	J	Z	z	j	z
1 0 1 1	11	VT	ESC	+	11	K	∕	∕	k	∕
1 1 0 0	12	FF	FS	,	12	L	∕	∕	l	∕
1 1 0 1	13	CR	GS	-	13	M	∕	∕	m	∕
1 1 1 0	14	SO	RS	.	14	N	∕	∕	n	∕
1 1 1 1	15	SI	US	/	15	O	∕	∕	o	∕

QM 156A

FIGURE A-4. NORWAY/DENMARK CCITT #5 KEYBOARD LAYOUTS AND CHARACTER CODES

QWINT INTERNATIONAL PROGRAMMER REFERENCE MANUAL

APPENDIX A. CCITT #5 KEYBOARDS AND CHARACTER CODES (Cont'd)



QM147A

				b7 →	0	0	0	0	1	1	1	1	1	
				b6 →	0	0	1	1	0	0	1	1		
				b5 →	0	1	0	1	0	1	0	1		
b	b	b	COL											
4	3	2	1	0	1	2	3	4	5	6	7			
				ROW										
0	0	0	0	0	NUL	DLE	SP	0	@	P	,	P		
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q		
0	0	1	0	2	STX	DC2	"	2	B	R	b	r		
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s		
0	1	0	0	4	EOT	DC4	\$	4	D	T	d	t		
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u		
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v		
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w		
1	0	0	0	8	BS	CAN	(	8	H	X	h	x	
1	0	0	1	9	HT	EM	)	9	I	Y	i	y	
1	0	1	0	10	LF	SUB	*	10	J	Z	j	z		
1	0	1	1	11	VT	ESC	+	11	K	Ä	k	ä		
1	1	0	0	12	FF	FS	,	12	L	Ö	l	ö		
1	1	0	1	13	CR	GS	-	13	M	Ä	m	ä		
1	1	1	0	14	SO	RS	.	14	N	Ü	n	ü		
1	1	1	1	15	SI	US	/	15	O	—	o	DEL		

QM157C

FIGURE A-5. SWEDEN CCITT #5 KEYBOARD LAYOUT AND CHARACTER CODES

QWINT INTERNATIONAL PROGRAMMER REFERENCE MANUAL

APPENDIX A. CCITT #5 KEYBOARDS AND CHARACTER CODES (Cont'd)



QM148A

				b7 →	0	0	0	0	1	1	1	1
				b6 →	0	0	1	1	0	0	1	1
				b5 →	0	1	0	1	0	1	0	1
b	b	b	b	COL ↓	0	1	2	3	4	5	6	7
4	3	2	1	ROW ↓								
0	0	0	0	0	NUL	DLE	SP	0	9	P	'	P
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	\$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10	LF	SUB	*	10	J	Z	j	z
1	0	1	1	11	VT	ESC	+	11	K	Ä	k	ä
1	1	0	0	12	FF	FS	,	12	L	Ö	l	ö
1	1	0	1	13	CR	GS	-	13	M	Ü	m	ü
1	1	1	0	14	SO	RS	.	14	N	^	n	β
1	1	1	1	15	SI	US	/	15	O	_	o	DEL

QM158

FIGURE A-6. GERMANY CCITT #5 KEYBOARD LAYOUT AND CHARACTER CODES

QWINT INTERNATIONAL PROGRAMMER REFERENCE MANUAL

APPENDIX A. CCITT #5 KEYBOARDS AND CHARACTER CODES (Cont'd)



QM149A

				b7 →	0	0	0	0	1	1	1	1	
				b6 →	0	0	1	1	0	0	1	1	
				b5 →	0	0	1	0	1	0	1	1	
b b b b	COL												
4 3 2 1	→ ↓	0	1	2	3	4	5	6	7				
ROW													
0 0 0 0	0	NUL	DLE	SP	0	á	P	ø	P				
0 0 0 1	1	SOH	DC1	!	1	A	Q	a	q				
0 0 1 0	2	STX	DC2	"	2	B	R	b	r				
0 0 1 1	3	ETX	DC3	#	3	C	S	c	s				
0 1 0 0	4	EOT	DC4	\$	4	D	T	d	t				
0 1 0 1	5	ENQ	NAK	%	5	E	U	e	u				
0 1 1 0	6	ACK	SYN	&	6	F	V	f	v				
0 1 1 1	7	BEL	ETB	'	7	G	W	g	w				
1 0 0 0	8	BS	CAN	(	8	H	X	h	x				
1 0 0 1	9	HT	EM	)	9	I	Y	i	y				
1 0 1 0	10	LF	SUB	*	10	J	Z	j	z				
1 0 1 1	11	VT	ESC	+	11	K	a	k	é				
1 1 0 0	12	FF	FS	,	12	L	ç	l	è				
1 1 0 1	13	CR	GS	-	13	M	ê	m	é				
1 1 1 0	14	SO	RS	.	14	N	î	n	ù				
1 1 1 1	15	SI	US	/	15	O	—	o	û				

QM159-B

FIGURE A-7. FRENCH CANADA CCITT #5 KEYBOARD LAYOUT AND CHARACTER CODES

APPENDIX A. CCITT #5 KEYBOARDS AND CHARACTER CODES (Cont'd)



QM150A

				b7 →	0	0	0	0	1	1	1	1
				b6 →	0	0	1	1	0	0	1	1
				b5 →	0	1	0	1	0	1	0	1
b	b	b	b	COL ↓	0	1	2	3	4	5	6	7
4	3	2	1	ROW ↓								
0	0	0	0	0	NUL	DLE	SP	0	à	P	`	P
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	&	3	C	S	c	s
0	1	0	0	4	EOT	DC4	\$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10	LF	SUB	*	10	J	Z	j	z
1	0	1	1	11	VT	ESC	+	11	K	°	k	°
1	1	0	0	12	FF	FS	,	12	L	ç	l	ç
1	1	0	1	13	CR	GS	-	13	M	§	m	§
1	1	1	0	14	SO	RS	.	14	N	>	n	>
1	1	1	1	15	SI	US	/	15	O	_	o	DEL

QM160

FIGURE A-8. FRANCE CCITT #5 KEYBOARD LAYOUT AND CHARACTER CODES

QWINT INTERNATIONAL PROGRAMMER REFERENCE MANUAL

APPENDIX A. CCITT #5 KEYBOARDS AND CHARACTER CODES (Cont'd)



QM151C

				b7 →	0	0	0	0	1	1	1	1
				b6 →	0	0	1	1	0	0	1	1
				b5 →	0	1	0	1	0	1	0	1
b	b	b	b	COL	0	1	2	3	4	5	6	7
4	3	2	1	ROW								
0	0	0	0	0	NUL	DLE	SP	0	g	P	,	P
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	£	3	C	S	c	s
0	1	0	0	4	EOT	DC4	\$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10	LF	SUB	*	10	J	Z	j	z
1	0	1	1	11	VT	ESC	+	11	K	[	k	[
1	1	0	0	12	FF	FS	,	12	L	~N	l	~N
1	1	0	1	13	CR	GS	-	13	M	~n	m	~n
1	1	1	0	14	SO	RS	.	14	N	^	n	^
1	1	1	1	15	SI	US	/	15	O	_	o	DEL

QM161

FIGURE A-9. SPAIN CCITT #5 KEYBOARD LAYOUT AND CHARACTER CODES

APPENDIX A. CCITT #5 KEYBOARDS AND CHARACTER CODES (Cont'd)



QM152A

				b7 →	0	0	0	0	1	0	1	0	1	1
				b6 →	0	0	0	1	1	0	0	1	1	
				b5 →	0	0	1	0	1	0	1	0	1	
b	b	b	b	COL ↓	0	1	2	3	4	5	6	7		
4	3	2	1	ROW ↓										
0	0	0	0	0	NUL	DLE	SP	0	9	P	ù	P		
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q		
0	0	1	0	2	STX	DC2	"	2	B	R	b	r		
0	0	1	1	3	ETX	DC3	£	3	C	S	c	s		
0	1	0	0	4	EOT	DC4	\$	4	D	T	d	t		
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u		
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v		
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w		
1	0	0	0	8	BS	CAN	(	8	H	X	h	x		
1	0	0	1	9	HT	EM	)	9	I	Y	i	y		
1	0	1	0	10	LF	SUB	*	10	J	Z	j	z		
1	0	1	1	11	VT	ESC	+	11	K	°	k	°		
1	1	0	0	12	FF	FS	,	12	L	§	l	§		
1	1	0	1	13	CR	GS	-	13	M	è	m	è		
1	1	1	0	14	SO	RS	.	14	N	é	n	é		
1	1	1	1	15	SI	US	/	15	O	^	o	^	DEL	

QM 162

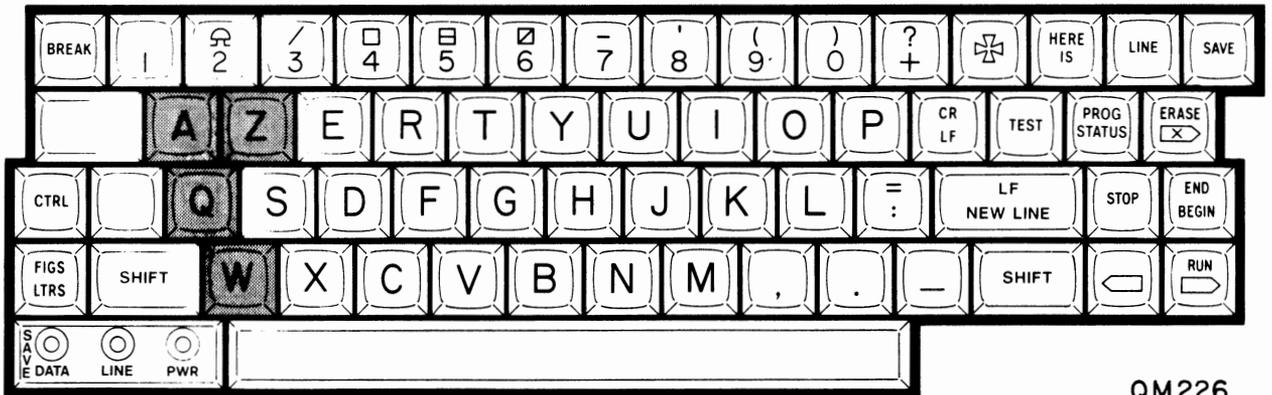
FIGURE A-10. ITALY CCITT #5 KEYBOARD LAYOUT AND CHARACTER CODES

APPENDIX B. CCITT #2 KEYBOARDS AND CHARACTER CODES



QM141

FIGURE B-1. UNIVERSAL CCITT #2
KEYBOARD LAYOUT: QWERTY



QM226

FIGURE B-2. FRENCH CCITT #2
KEYBOARD LAYOUT: AZERTY



QM227

FIGURE B-3. GERMAN CCITT #2
KEYBOARD LAYOUT: QWERTZ

APPENDIX B. CCITT #2 KEYBOARDS AND CHARACTER CODES (Cont'd)

	FIGS F	FIGS G	FIGS H	=	+
UNIVERSAL	□	■	■	=	+
U.S. UNIVERSAL	\$	&	#	=	+
U.S.	\$	&	#	;	'
U.K.	%	@	£	=	+
FRANCE	É	%	#	=	+
NORWAY	Å	Æ	Ø	=	+
DENMARK	Å	Æ	Ø	=	+
SWEDEN	Å	Ä	Ö	=	+
FINLAND	Å	Ä	Ö	=	+
GERMANY	Ö	Ä	Ü	=	+
ITALY	£	%	¢	=	+
SPAIN	%	ñ	ñ	=	+
FRENCH CANADA	É	%	\$	=	+

FIGURE B-4. CCITT #2 CHARACTER SET NATIONAL VARIANTS

A Little, Smarter Way

To Communicate...™