

---

## Character codes

---

Tables 14-1 and 14-2 show how the Remote Batch Service translates 860 character codes to these IBM character codes:

- 2770/3780 EBCDIC WP
- 2770/3780 EBCDIC DP
- 2780 EBCDIC DP/WP

Table 14-1 lists the 860 characters and their corresponding EBCDIC characters. Several entries appear in square brackets:

- [Discard] indicates a reasonable equivalent does not exist; the Remote Batch Service discards the character or code.
- [unknown] indicates a reasonable equivalent does not exist; the Remote Batch Service inserts a question mark in the text.
- Any other entry within square brackets identifies a software procedure that is performed when the code is encountered.

Table 14-2 lists the software procedures, which are named after the 860 characters they convert.

Table 14-1. 860 to EBCDIC character code conversion

860			2770/3780 EBCDIC WP		2770/3780 EBCDIC DP		2780 EBCDIC DP/WP	
Sym	Name	Hex	Name	Hex	Name	Hex	Name	Hex
	EOS	00	[Discard]		[Discard]		[Discard]	
	NUL	01						
	space	20	space	40	space	40	space	40
!	exclamation	21	. (period)	4B	!	5A	!	5A
"	quotes	22	"	7F	"	7F	"	7F
#	pound	23	#	7B	#	7B	#	7B
\$	dollar	24	\$	5B	\$	5B	\$	5B
%	percent	25	%	6C	%	6C	%	6C
&	ampersand	26	&	50	&	50	&	50
'	apostrophe	27	'	7D	'	7D	'	7D
(	left paren	28	(	4D	(	4D	(	4D
)	right paren	29	)	5D	)	5D	)	5D
*	asterisk	2A	*	5C	*	5C	*	5C
+	plus	2B	+	4E	+	4E	+	4E
,	comma	2C	,	6B	,	6B	,	6B
-	hyphen	2D	- (req. hyphen)	60	- (req. hyphen)	60	- (req. hyphen)	60
.	period	2E	.	4B	.	4B	.	4B
/	slash	2F	/	61	/	61	/	61
0	zero (digit)	30	0	F0	0	F0	0	F0
1	one (digit)	31	d1	F1	d1	F1	d1	F1
2	two (digit)	32	d2	F2	d2	F2	d2	F2
3	three (digit)	33	d3	F3	d3	F3	d3	F3
4	four (digit)	34	d4	F4	d4	F4	d4	F4
5	five (digit)	35	d5	F5	d5	F5	d5	F5
6	six (digit)	36	d6	F6	d6	F6	d6	F6
7	seven (digit)	37	d7	F7	d7	F7	d7	F7
8	eight (digit)	38	d8	F8	d8	F8	d8	F8
9	nine (digit)	39	d9	F9	d9	F9	d9	F9
:	colon	3A	:	7A	:	7A	:	7A
;	semicolon	3B	;	5E	;	5E	;	5E
<	less than	3C	( (leftParen)	4D	<	4C	<	4C
=	equals	3D	=	7E	=	7E	=	7E
>	greaterThan	3E	) (rightParen)	5D	>	6E	>	6E
?	question mark	3F	?	6F	?	6F	?	6F
@	at	40	@	7C	@	7C	@	7C
A	(upper-case)	41	A	C1	A	C1	A	C1
B	(upper-case)	42	B	C2	B	C2	B	C2
C	(upper-case)	43	C	C3	C	C3	C	C3
D	(upper-case)	44	D	C4	D	C4	D	C4
E	(upper-case)	45	E	C5	E	C5	E	C5
F	(upper-case)	46	F	C6	F	C6	F	C6
G	(upper-case)	47	G	C7	G	C7	G	C7

860			2770/3780 EBCDIC WP		2770/3780 EBCDIC DP		2780 EBCDIC DP/WP	
Sym	Name	Hex	Name	Hex	Name	Hex	Name	Hex
H	(upper-case) ..	48	H .....	C8	H .....	C8	H .....	C8
I	(upper-case) ..	49	I .....	C9	I .....	C9	I .....	C9
J	(upper-case) ..	4A	J .....	D1	J .....	D1	J .....	D1
K	(upper-case) ..	4B	K .....	D2	K .....	D2	K .....	D2
L	(upper-case) ..	4C	L .....	D3	L .....	D3	L .....	D3
M	(upper-case) ..	4D	M .....	D4	M .....	D4	M .....	D4
N	(upper-case) ..	4E	N .....	D5	N .....	D5	N .....	D5
O	(upper-case) ..	4F	O .....	D6	O .....	D6	O .....	D6
P	(upper-case) ..	50	P .....	D7	P .....	D7	P .....	D7
Q	(upper-case) ..	51	Q .....	D8	Q .....	D8	Q .....	D8
R	(upper-case) ..	52	R .....	D9	R .....	D9	R .....	D9
S	(upper-case) ..	53	S .....	E2	S .....	E2	S .....	E2
T	(upper-case) ..	54	T .....	E3	T .....	E3	T .....	E3
U	(upper-case) ..	55	U .....	E4	U .....	E4	U .....	E4
V	(upper-case) ..	56	V .....	E5	V .....	E5	V .....	E5
W	(upper-case) ..	57	W .....	E6	W .....	E6	W .....	E6
X	(upper-case) ..	58	X .....	E7	X .....	E7	X .....	E7
Y	(upper-case) ..	59	Y .....	E8	Y .....	E8	Y .....	E8
Z	(upper-case) ..	5A	Z .....	E9	Z .....	E9	Z .....	E9
[	left bracket ...	5B	[ .....	4A	{ (left brace) .	C0	( (left paren) ..	4D
\	backslash .....	5C	/ (slash) .....	61	\ .....	E0	/ (slash) .....	61
]	right bracket ..	5D	[ .....	5A	} (right brace) .	D0	) (right paren) .	5D
↑	up arrow .....	5E	(vertical bar) .	4F	(vertical bar) .	4F	(vertical bar) .	4F
—	underscore ...	5F	— .....	6D	— .....	6D	— .....	6D
¢	cent .....	60	¢ .....	5F	¢ .....	4A	¢ .....	4A
a	(lower-case) ..	61	a .....	81	a .....	81	a .....	81
b	(lower-case) ..	62	b .....	82	b .....	82	b .....	82
c	(lower-case) ..	63	c .....	83	c .....	83	c .....	83
d	(lower-case) ..	64	d .....	84	d .....	84	d .....	84
e	(lower-case) ..	65	e .....	85	e .....	85	e .....	85
f	(lower-case) ..	66	f .....	86	f .....	86	f .....	86
g	(lower-case) ..	67	g .....	87	g .....	87	g .....	87
h	(lower-case) ..	68	h .....	88	h .....	88	h .....	88
i	(lower-case) ..	69	i .....	89	i .....	89	i .....	89
j	(lower-case) ..	6A	j .....	91	j .....	91	j .....	91
k	(lower-case) ..	6B	k .....	92	k .....	92	k .....	92
l	(lower-case) ..	6C	l .....	93	l .....	93	l .....	93
m	(lower-case) ..	6D	m .....	94	m .....	94	m .....	94
n	(lower-case) ..	6E	n .....	95	n .....	95	n .....	95
o	(lower-case) ..	6F	o .....	96	o .....	96	o .....	96
p	(lower-case) ..	70	p .....	97	p .....	97	p .....	97
q	(lower-case) ..	71	q .....	98	q .....	98	q .....	98
r	(lower-case) ..	72	r .....	99	r .....	99	r .....	99
s	(lower-case) ..	73	s .....	A2	s .....	A2	s .....	A2
t	(lower-case) ..	74	t .....	A3	t .....	A3	t .....	A3
u	(lower-case) ..	75	u .....	A4	u .....	A4	u .....	A4
v	(lower-case) ..	76	v .....	A5	v .....	A5	v .....	A5
w	(lower-case) ..	77	w .....	A6	w .....	A6	w .....	A6

860			2770/3780 EBCDIC WP		2770/3780 EBCDIC DP		2780 EBCDIC DP/WP	
Sym	Name	Hex	Name	Hex	Name	Hex	Name	Hex
x	(lower-case) ..	78	x .....	A7	x .....	A7	x .....	A7
y	(lower-case) ..	79	y .....	A8	y .....	A8	y .....	A8
z	(lower-case) ..	7A	z .....	A9	z .....	A9	z .....	A9
{	left brace .....	7B	[ (left bracket)	4A	{ .....	C0	( (left paren) ..	4D
	vertical bar ....	7C	.....	4F	.....	4F	.....	4F
}	right brace ....	7D	] (right bracket)	5A	} .....	D0	) (right paren) .	5D
~	tilde .....	7E	- (req. hyphen)	60	~ .....	A1	- (req. hyphen)	60
DEL	.....	7F	DEL .....	07	DEL .....	07	[Discard] .....	
BSO	.....	80	[Discard] .....		[Discard] .....		[Discard] .....	
ESO	.....	81	[Discard] .....		[Discard] .....		[Discard] .....	
BBD	.....	82	[Discard] .....		[Discard] .....		[Discard] .....	
EBD	.....	83	[Discard] .....		[Discard] .....		[Discard] .....	
BUS	.....	84	[Discard] .....		[Discard] .....		[Discard] .....	
EUS	.....	85	[Discard] .....		[Discard] .....		[Discard] .....	
PGNO	.....	88	# (pound) ...	7B	# (pound) ...	7B	# (pound) ...	7B
CDU	.....	89	[Discard] .....		[Discard] .....		[Discard] .....	
RVN	.....	8A	[Discard] .....		[Discard] .....		[Discard] .....	
HLT	.....	8B	BEL .....	2F	[Discard] .....		[Discard] .....	
ESI	.....	8D	[ESlxwp] .....		[ESlxdp] .....		[ESlx80] .....	
AREF	.....	8E	[AREFxwp] .....		[AREFxdp] .....		[AREFx80] .....	
REF	.....	8F	[REFxwp] .....		[REFxdp] .....		[REFx80] .....	
FMT	.....	90	[FMTxwp] .....		[FMTxdp] .....		[FMTx80] .....	
CMD	.....	91	[CMDxwp] .....		[CMDxdp] .....		[CMDx80] .....	
NCOL	.....	92	[Discard] .....		[Discard] .....		[Discard] .....	
RNCOL	.....	93	[Discard] .....		[Discard] .....		[Discard] .....	
PGE	.....	94	FF .....	0C	FF .....	0C	FF .....	0C
RPGE	.....	95	EOP .....	3A	FF .....	0C	FF .....	0C
CRN	.....	96	[CRNxwp] .....		IRS .....	1E	[CRNx80] .....	
PCR	.....	97	[PCRxwp] .....		IRS .....	1E	[PCRx80] .....	
RET	.....	98	IRS .....	1E	IRS .....	1E	[CRNx80] .....	
TAB	.....	99	IT .....	39	HT .....	05	[TABx80] .....	
PTB	.....	9A	HT .....	5	HT .....	05	[PTBx80] .....	
LFEED	.....	9B	LF .....	25	LF .....	25	LF .....	25
INX	.....	9C	[INXxwp] .....		[INXxdp] .....		[INXx80] .....	
RIX	.....	9D	[RIXxwp] .....		[Discard] .....		[Discard] .....	
UBS	.....	9E	UBS .....	1A	[Discard] .....		[Discard] .....	
PBS	.....	9F	NBS .....	36	BS .....	16	BS .....	16
PSP	.....	A0	RSP .....	41	RSP .....	41	SP .....	40
THYP	.....	A1	[THYPxwp] .....		[THYPxdp] .....		[THYPx80] .....	
2	(superscript) ..	A2	2 .....	C0	2 (digit) .....	F2	2 (digit) .....	F2
3	(superscript) ..	A3	3 .....	D0	3 (digit) .....	F3	3 (digit) .....	F3
°	degree .....	A4	° .....	A1	* (asterisk) ...	5C	* (asterisk) ...	5C
μ	micro .....	A5	u (lower-case)	A4	u (lower-case)	A4	u (lower-case)	A4
¶	paragraph ....	A6	¶ .....	6E	P (upper-case)	D7	P (upper-case)	D7
§	section .....	A7	§ .....	4C	S (upper-case)	E2	S (upper-case)	E2

860			2770/3780 EBCDIC WP		2770/3780 EBCDIC DP		2780 EBCDIC DP/WP	
Sym	Name	Hex	Name	Hex	Name	Hex	Name	Hex
(	(expanded) ...	A8	( (left paren) .	4D	( (left paren) ..	4D	( (left paren) ..	4D
)	(expanded) ...	A9	) (right paren) .	5D	) (right paren) .	5D	) (right paren) .	5D
	ESPA .....	AA	NSP .....	E1	(space) .....	40	(space) .....	40
±	plus or minus ..	AB	± .....	79	+ (plus) .....	4E	+ (plus) .....	4E
,	(expanded) ...	AC	, (comma) ...	6B	, (comma) ...	6B	, (comma) ...	6B
-	(expanded) ...	AD	- (RHY) .....	60	- (RHY) .....	60	- (RHY) .....	60
.	(expanded) ...	AE	. (period) ....	4B	. (period) ....	4B	. (period) ....	4B
.	abbreviation ...	AF	. (period) ....	4B	. (period) ....	4B	. (period) ....	4B
÷	divide .....	B0	/ (slash) .....	61	/ (slash) .....	61	/ (slash) .....	61
®	registered .....	B1	r (lower-case) ..	99	r (lower-case) ..	99	r (lower-case) ..	99
•	dot .....	B2	. (period) ....	4B	. (period) ....	4B	. (period) ....	4B
™	trademark .....	B3	T (upper-case) ..	E3	T (upper-case) ..	E3	T (upper-case) ..	E3
©	copyright .....	B4	c (lower-case) ..	83	c (lower-case) ..	83	c (lower-case) ..	83
↓	down arrow ...	B5	v (lower-case) ..	A5	v (lower-case) ..	A5	v (lower-case) ..	A5
≠	not equal .....	B6	# (pound) ...	7B	# (pound) ...	7B	# (pound) ...	7B
∇	diamond .....	B7	° (degree) ...	A1	? [unknown] ..	6F	* (asterisk) ...	5C
▷	DELL .....	B8	? [unknown] ..	6F	? [unknown] ..	6F	? [unknown] ..	6F
	grave accent ..	B9	' (apostrophe) ..	7D	' (apostrophe) ..	7D	' (apostrophe) ..	7D
	circumflex ....	BA	? [unknown] ..	6F	? [unknown] ..	6F	? [unknown] ..	6F
$\frac{1}{4}$	quarter .....	BB	$\frac{1}{4}$ .....	E0	[QUARxdp] .....		[QUARx80] .....	
$\frac{1}{3}$	third .....	BC	[THRDxwp] .....		[THRDxdp] .....		[THRDx80] .....	
$\frac{1}{2}$	half .....	BD	$\frac{1}{2}$ .....	6A	[HALFxdp] .....		[HALFx80] .....	
$\frac{2}{3}$	two-third .....	BE	[THRDxwp] .....		[THRDxdp] .....		[THRDx80] .....	
$\frac{3}{4}$	three-quarter ..	BF	[THREEQUARxwp]		[THREEQUARxdp]		[THREEQUARx80]	
+	graphic intersect	C0	+ (plus) ....	4E	+ (plus) ....	4E	+ (plus) .....	4E
-	graphic horiz line	C1	notInXtoWPTTable		notInXtoDPTTable		notInXtoE80Table	
	graphic vert line	C2	- (RHY) .....	60	- (RHY) .....	60	- (RHY) .....	60
+	bold graphic ..	C3	+ (plus) ....	4E	+ (plus) ....	4E	+ (plus) .....	4E
-	bold graphic ..	C4	- (RHY) .....	60	- (RHY) .....	60	- (RHY) .....	60
	bold graphic ..	C5	(vertical bar)	4F	(vertical bar)	4F	(vertical bar)	4F
	shade .....	C6	? [unknown] ..	6F	? [unknown] ..	6F	? [unknown] ..	6F
Æ	(upper-case) ..	D0	A (upper-case)	C1	A (upper-case)	C1	A (upper-case)	C1
æ	(lower-case) ..	D1	a (lower-case)	81	a (lower-case)	81	a (lower-case)	81
Ø	slashed O (u-case)	D2	O (upper-case)	D6	O (upper-case)	D6	O (upper-case)	D6
ø	slashed o (l-case)	D3	o (lower-case)	96	o (lower-case)	96	o (lower-case)	96
l	lind .....	D4	? [unknown] ..	6F	? [unknown] ..	6F	? [unknown] ..	6F
œ	CE .....	D5	o (lower-case)	96	o (lower-case)	96	o (lower-case)	96
ij	IJ .....	D6	i (lower-case) .	89	i (lower-case) .	89	i (lower-case) .	89
'n	apostrophe-n .	D7	n (lower-case)	95	n (lower-case)	95	n (lower-case)	95
€	cruz (money) ..	D8	C (upper-case)	C3	C (upper-case)	C3	C (upper-case)	C3
Pts	pesetas (money)	D9	P (upper-case)	D7	P (upper-case)	D7	P (upper-case)	D7
f	florin (money) .	DA	f (lower-case)	86	f (lower-case) .	86	f (lower-case) .	86
£	pounds (money)	DB	L (upper-case)	D3	L (upper-case)	D3	L (upper-case)	D3
¥	yen (money) .	DC	Y (upper-case)	E8	Y (upper-case)	E8	Y (upper-case)	E8
\$	.....	DD	? [unknown] ..	6F	? [unknown] ..	6F	? [unknown] ..	6F
¡	inverted excl ..	DE	i (lower-case) .	89	i (lower-case) .	89	i (lower-case) .	89
¿	inverted question	DF	? (question) ..	6F	? (question) ..	6F	? (question) ..	6F

860			2770/3780 EBCDIC WP		2770/3780 EBCDIC DP		2780 EBCDIC DP/WP	
Sym	Name	Hex	Name	Hex	Name	Hex	Name	Hex
ß	German ss . . . .	E0	B (upper-case)	C2	B (upper-case)	C2	B (upper-case)	C2
ℓ	litre . . . . .	E1	l (lower-case) .	93	l (lower-case) .	93	l (lower-case) .	93
o	underlined o . .	E2	o (lower-case)	96	o (lower-case)	96	o (lower-case)	96
a	underlined a . .	E3	a (lower-case)	81	a (lower-case)	81	a (lower-case)	81
Å	A with circle . .	E4	A (upper-case)	C1	A (upper-case)	C1	A (upper-case)	C1
ä	a with circle . . .	E5	a (lower-case)	81	a (lower-case)	81	a (lower-case)	81
`	u-case grave . .	E7	' (apostrophe)	7D	` (grave) . . . . .	79	' (apostrophe)	7D
^	u-case circumflex	E8	? [unknown] . .	6F	? [unknown] . .	6F	.....	
¨	umlaut . . . . .	E9	[Discard] . . . . .		NUL . . . . .	00	[Discard] . . . . .	
~	tilda . . . . .	EA	[Discard] . . . . .		NUL . . . . .	00	[Discard] . . . . .	
'	accent . . . . .	EB	' (apostrophe)	7D	' (apostrophe)	7D	' (apostrophe)	7D
`	l-case grave . . .	EC	apostrophe . .	7D	grave . . . . .	79	apostrophe . .	7D
^	l-case circumflex	ED	[Discard] . . . . .		NUL . . . . .	00	[Discard] . . . . .	
	CDL . . . . .	EE	[Discard] . . . . .		NUL . . . . .	00	[Discard] . . . . .	
	ULN . . . . .	EF	[Discard] . . . . .		NUL . . . . .	00	[Discard] . . . . .	
	USEP . . . . .	FB	? [unknown] . .	6F	? [unknown] . .	6F	? [unknown] . .	6F
	GSEP . . . . .	FC	? [unknown] . .	6F	? [unknown] . .	6F	? [unknown] . .	6F
	FSEP . . . . .	FD	? [unknown] . .	6F	? [unknown] . .	6F	? [unknown] . .	6F
	RSEP . . . . .	FE	? [unknown] . .	6F	? [unknown] . .	6F	? [unknown] . .	6F
	SOS . . . . .	FF	[Discard] . . . . .		[Discard] . . . . .		[Discard]	

### Notes

1. FMT is the 860 format group character. FMT is followed by a set of parameters that define such properties as margins, tabs, line spacing, and justification. Values for these properties remain in effect until another FMT is encountered. FMT parameters are arranged in fields, separated by FSEP characters. Only one field, format type, is required; there are six remaining optional fields.

The FMT conversion procedures translate FMT parameters to their nearest equivalents among EBCDIC page formatting codes. See the "860 Document File Format," Version 1.4, for a description of FMT parameters.

2. CMD is the 860 command group character. A leading CMD is followed by one of six command classifiers that dictates the action to be performed on text that lies between CMDs. Actions include recording a null, centering within columns or margins, and making text flush right.

The CMD conversion procedures look for a command specifier immediately following the CMD. If a command classifier is present it looks for an optional argument to that classifier and translates the command to its nearest EBCDIC equivalent. See the "860 Document File Format," Version 1.4, for a description of CMD command classifiers and arguments.

Table 14-2. Conversion procedures

Procedure Name	860 Character Description	Function
AREFxwp, AREFxdp, AREFx80	Alternate reference group	Discard AREF and all characters up to and including next AREF.
CMDxwp, CMDxdp, CMDx80	Command group	See note 2.
CRNxwp, CRNx80	Carriage return	If CRN, PCR, or PTB is encountered, output an RCR (06h, an EBCDIC WP carriage return), then an IRS (1Eh).
ESIxwp, ESIdxp, ESIX80	Used in conversions. 860 ignores intervening characters.	Once ESI is encountered, discard all characters until HLT is encountered.
FMTxwp, FMTxdp, FMTx80	Format group	See note 1.
HALFxdp, HALFx80	$\frac{1}{2}$	Output a one, a slash, and a two.
INXxwp	Index. Move vertical position down 1/24 inch.	Outputs SBS (38h).
INXxdp, INXx80	Index. Move vertical position down 1/24 inch.	Discard INX character.
PCRxwp, PCRx80	Precedented (required) carriage return.	Same as procedures for CRN.
QUARxdp, QUARx80	$\frac{1}{4}$	Output a one, a slash, and a four.
REFxwp, REFxdp, REFx80	Reference group.	Same as procedures for AREF.
RIXxwp	Reverse Index. Move vertical position up 1/24 inch.	Output SPS (9h).
THRDxwp, THRDxdp, THRDx80 (in response to $\frac{1}{3}$ )	$\frac{1}{3}$	Output a one, a slash, and a three.
THRDxwp, THRDxdp, THRDx80 (in response to $\frac{2}{3}$ )	$\frac{2}{3}$	Output a two, a slash, and a three.
THREEQUARxwp, THREEQUARxdp, THREEQUARx80	$\frac{3}{4}$	Output a three, a slash, and a four.
THYPxwp	Temporary hyphen	Look for a following CRN or PCR character. If a CRN is found, procedures output SHY (CAh), then IRS (1Eh). If a PCR is found, procedures output SHY, then RCR (06h). If neither a CRN or PCR is present, the THYP is discarded.
THYPxdp, THYPx80	Temporary hyphen	Look for a following CRN or PCR character. If a CRN is found, procedures output RHY (60h), then IRS (1Eh). If a PCR is found, procedures output SHY, then RCR. If neither a CRN or PCR is present, the THYP is discarded.

**Notes**

The following EBCDIC 2770 WP characters have no mapping from Xerox 860 characters (all numerical equivalents are in hexadecimal):

NUL	00	BS	16	CU2	2B
RCR	06	IGS	1D	IRT	33
SPS	09	WUS	23	SBS	38
RPT	0A	ESC	27	SHY	CA
NL	15	SW	2A		

The following EBCDIC 2770 DP characters have no mapping from Xerox 860 characters (all numerical equivalents are in hexadecimal):

RCR	06	ESC	27	IT	39
SPS	09	SW	2A	EOP	
RPT	0A	CU2	2B	negation	5F
NL	15	BEL	2F	or	6A
UBS	1A	IRT	33	SHY	CA
IGS	1D	NBS	36	NSP	E1
WUS	23	SBS	38		

The following EBCDIC 2780 DP/WP characters have no mapping from Xerox 860 characters (all numerical equivalents are in hexadecimal):

HT	05	ESC	27
EM	19	BEL	2F
IUS	1F		