1. Introduction. This document proposes the addition to the UCS of 731 new graphic characters to provide compatibility with a wide range of home computers, or “microcomputers,” manufactured approximately from the mid-1970s to the mid-1980s, and with the teletext broadcasting standard originally developed in the early 1970s.

**NOTE:** Mapping tables between legacy character sets and the allocations in this proposal are attached to the PDF version of this document.

2. History. Box-drawing characters, solid and shaded blocks, and similar graphic characters were encoded in the UCS in 1991 (Unicode 1.0) for compatibility with established character sets, both in popular microcomputers—particularly the IBM PC—and in terminal-emulation software. The set of block characters was augmented in 1999 (Unicode 3.0) and in 2002 (Unicode 3.2) to cover additional platforms, due largely to proposals by Frank da Cruz (L2/98-353 through -355, L2/98-413, and L2/00-159), which also included C1 and EBCDIC control pictures, hex byte pictures, and some other graphic characters that were not accepted.

A list discussion in April 2017 concerning the “PETSCII” character set, used in various forms by Commodore home computers ranging from the PET (1977) to the C128 (1985), led to the formation of an ad-hoc Terminals Working Group. The group proposed additional characters from legacy computers and teletext (L2/17-435, L2/18-235, L2/18-275, and L2/19-025) which were accepted into Unicode 13.0.

Feedback from the Script Ad Hoc, as well as from the user community, revealed a desire to encode additional characters from lesser-known legacy computer platforms—particularly the Mattel Aquarius and the Sharp MZ series—that the group did not propose in L2/19-025. This
feedback led to an investigation by the group into additional character sets for a second proposal, which resulted in this document.

Computers of this era enjoyed a great deal of popularity and spawned a large number of computer clubs and user groups devoted to these machines. Some of the original user groups are still in existence, and new ones, often online-only, have emerged more recently. Even less popular platforms such as the Mattel Aquarius still have hobbyists producing new software to this day. The characters proposed here are intended to benefit these users and hobbyists, by providing round-trip convertibility of character data between legacy platforms and the UCS. They may also facilitate the creation of software for these platforms, such as emulators and cross-assemblers, and have been requested by developers of present-day text-mode applications as well, to enhance pseudo-graphical displays.

3. Microcomputer platforms. The group considered the following microcomputer platforms and character sets for this proposal:

- Amstrad CPC (464, 664, 6128, etc.)
- Apple 8-bit computers (II, II Plus, IIe, IIc, III, and the 16-bit IIgs)
- HP terminals (300, 250, 2640 series, 2620 series, etc.)
- Kaypro CP/M-based computers (II, IV, 10)
- Mattel Aquarius
- Ohio Scientific computers (Model 500, Challenger III, Superboard II, etc.)
- Robotron KC series computers (Z9001, KC 87, KC 85/1)
- Sharp MZ series computers (MZ-80K, MZ-700, etc.)
- Sharp X1 computers (X1, X1turbo, X1turbo Z)
- Tandy TRS-80 computers (TRS-80 Model I, Model III, Model 4, Color Computer)

Some of these platforms were also considered in L2/19-025. However, the combination of low-resolution images and lack of supporting information meant that some characters were difficult or impossible to identify at the time, and consequently had not been proposed. These characters have since been identified and have been proposed in this document.

We have collected search result and sales figures for the platforms being considered to assist in evaluating their viability for encoding. Screenshots of search result figures are included at the end of the Figures section, and sources for units sold are linked in the PDF version of this document. Sales and search result figures are summarized at the top of the next page. We further discuss the viability of encoding characters from these platforms in section 9.
4. Teletext. Teletext was a service invented in the United Kingdom in the early 1970s for broadcasting pages of information, generally text and simple block graphics, to analog television receivers via the vertical blanking interval. Teletext found its greatest popularity in Europe, where it was commonplace until the adoption of digital television; almost all analog television sets sold in Europe since the early 1980s had built-in teletext decoders.

Several different 7-bit character sets were defined for teletext, including a complete set of $2 \times 3$ block graphics (64 in all), analogous to the block quadrants found in other platforms. These block graphics were proposed in L2/19-025 and accepted into Unicode 13.0. However, teletext also supported a “separated graphics” mode in which block characters could be displayed with a narrow space between cells. These separated block graphics were not proposed as distinct characters at the time. Since then, teletext users have expressed a need for encoding separated block graphics as distinct characters to enable teletext emulation and to maintain compatibility with existing software which uses an already-established Private Use Area encoding for $2 \times 3$ block graphics in both contiguous and separated form.

5. Graphic characters. Most of the characters proposed in this document are semigraphics: block-style symbols which could be combined to simulate an all-points-addressable graphic display. Many platforms used these text characters to support a so-called “graphics mode”: small blocks could be “plotted” at various coordinates, and the appropriate full-sized block character consisting of the necessary “on” and “off” blocks would be displayed in text mode (Figure 17). The set also includes numerous box-drawing and shading characters, and some miscellaneous characters such as arrows, schematic symbols, and video game sprites, which were present in the target platforms.

The word “octant” is used in this document, by analogy with “quadrant”—a term used for certain UCS characters since 1999—and “sextant”—a term used for characters proposed by the group in its previous proposal—to refer to a semigraphics block consisting of eight smaller blocks or “cells” arranged in two columns and four rows. On Kaypro CP/M-based microcomputers, these block graphics were accessible in the code space above ASCII (Figure 4) and could even be included in text files (Figure 18).
Twenty-six of the 256 octant block characters were unified with existing characters or other characters being proposed: seventeen were unified with visually identical half-blocks, quarter-blocks, and quadrants already encoded in the Block Elements block; two were unified with quarter-blocks already encoded in the Symbols for Legacy Computing block; six were unified with other block characters being proposed; and the empty block can be mapped to an existing space character with suitable properties, such as U+00A0 NO-BREAK SPACE.

Some of the graphic characters are intended to be used together, to represent images that would not fit within a single character block. Examples include UPPER LEFT, UPPER RIGHT, LOWER LEFT, and LOWER RIGHT QUADRANT CHESS KING from the Sharp MZ series and TOP and BOTTOM HALF STANDING PERSON from the Mattel Aquarius. These are analogous to U+2320 TOP HALF INTEGRAL and U+2321 BOTTOM HALF INTEGRAL, which, like the present characters, were encoded for compatibility.

In a more extreme example, the HP 2640 and HP 2620 series of terminals supported a “large type” character ROM with graphic characters representing pieces of alphanumeric characters. This was intended for rendering large headlines in terminal applications, as shown in Figure 20 and explained in an HP terminal manual in Figure 21.

6. Outlined digits and uppercase Latin letters. The European character set for Sharp MZ series machines defined clones of the ASCII digits 0 through 9 and uppercase Latin letters A through Z, drawn as outlines, in the upper half of its code space (Figure 9). These outlined digits and letters were used in logos and artwork, separate from regular ASCII digits and letters (Figure 13). They are proposed here at code points U+1CCD6 through U+1CCF9.

7. Characters not proposed. Not all characters identified in the target platforms were deemed suitable for encoding. For example, the European character set for Sharp MZ machines included four characters with an obvious resemblance to the ghosts from Pac-Man. These symbols were determined to be IP-encumbered and thus are not proposed here.

“Reverse video” or “inverse video” characters, which were present on nearly all microcomputers of the 1970s and 1980s and often served the same purpose that bold or italic characters serve today, have been determined to be out of scope for the UCS and are not proposed here. The ISO 6429 display sequences SGR 7 (“negative image”) and SGR 27 (“positive image”) are suggested as a higher-level protocol to achieve this effect.

Control characters from microcomputer platforms and teletext were also determined to be out of scope for the UCS. These characters were located in what would today be considered the C0 control range (0x00–0x1F) or the C1 control range (0x7F–0x9F). Processes that need to interchange these codes should simply interchange the binary C0 or C1 value, extended to the UCS code space but without further mapping. Emulators should treat these control codes as appropriate for the targeted environment.
8. **Finiteness.** We have received concerns that there may be no end to the number of unencoded characters found in old microcomputers and terminals, leading to no end of future proposals should these characters be accepted. We believe this is not the case, for the following reasons.

1. We are focusing exclusively on computers and terminals—devices designed to interchange data with other devices—and not on arcade machines, game consoles, calculators, or any other kind of closed system.

2. We have conducted an exhaustive search of MAME (formerly Multiple Arcade Machine Emulator; a long-running project dedicated to documenting and emulating every arcade machine, game console, computer, terminal, calculator, or similar device), looking for characters from legacy computer platforms that have not yet been encoded, and have scraped the bottom of the barrel. The chances of finding a novel character are now significantly lower having found these, and the chances of finding one on a platform of any significance practically zero. This will certainly be the last proposal of such a large number of characters.

3. We are looking backward in time, not forward, and there are only so many years to go back before digital computers cease to exist, let alone be able to render text. We have found other interesting symbols on devices such as radar displays, but are not proposing them as they are out of scope for this proposal.

4. As the IBM PC came to dominate the market in the 80s, interoperability with PCs became an important consideration, leading to a mass extinction of other platforms and character sets along with them: more and more machines abandoned their novel character sets in favor of IBM’s. While examining computers released after the IBM PC, even platforms targeted at Eastern markets, we found very few new symbols.

5. Character sets used to be a clever solution to overcome the lack of pixel addressability and graphics modes, a need that disappeared completely in the 80s as computers became powerful enough to draw symbols using individual pixels. Taken with the previous considerations, this leaves only a small window of less than two decades in which novel characters appear.

6. Even if we were looking forward, modern-day 8-bit machines such as the Commander X16 usually stick to existing character sets such as CP437, ISO-8859-1, or PETSCII and are unlikely to invent anything novel except as user-defined characters, which are outside the scope of both Unicode and this proposal.

9. **Alternate proposals.** All that being said, we are open to encoding a subset of the characters being proposed in this document, should the evidence for more obscure platforms be considered insufficient.

At a minimum, we are requesting the addition of missing characters from the microcomputer platforms already considered in L2/19-025 (Amstrad CPC, Apple II, and TRS-80).

We also strongly recommend the addition of characters from the Sharp MZ and Sharp X1 platforms, as these have been the most requested and have the second-highest sales and search result figures of the platforms not considered in L2/19-025. If the video game sprites from the European model of the Sharp MZ are determined to be unacceptable for encoding, we are willing
to reduce the set to only characters from the Japanese model, since the Sharp platforms were better known in Japan than internationally.

The separated block sextant graphics from Teletext, block octant graphics from the Kaypro, and characters from the Mattel Aquarius are of medium importance. The teletext characters are part of a de jure standard issued by the ITU and are already in widespread use using an existing Private Use Area encoding, and their inclusion would provide complete compatibility with that encoding. The Kaypro is the best-selling and most widely known of the platforms not previously considered, and ran the CP/M operating system, which enjoyed a high degree of interoperability with other platforms. The Mattel Aquarius is the only other platform yet to be mentioned in this section with 100,000 or more Google Search results, is still seeing development of new software even to this day, and was previously considered, albeit only partially, in L2/19-025.

The remaining platforms (HP 2620/2640, Ohio Scientific, and Robotron KC) are of low importance. (We have found documentation for other HP terminals claiming support for a line drawing character set as in the case of the HP 2620 and HP 2640, but have not found proof that they support the same characters.) We understand that the low numbers, both of search results and of units sold, make it difficult to justify inclusion of these platforms.

<table>
<thead>
<tr>
<th>Importance</th>
<th>Priority</th>
<th>Platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>1</td>
<td>Amstrad CPC, Apple II, TRS-80</td>
</tr>
<tr>
<td>High</td>
<td>2</td>
<td>Sharp MZ (Japanese Set), Sharp X1</td>
</tr>
<tr>
<td>High</td>
<td>3</td>
<td>Sharp MZ (European Set)</td>
</tr>
<tr>
<td>Medium</td>
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<td>Teletext</td>
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<td>Kaypro</td>
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<tr>
<td>Medium</td>
<td>6</td>
<td>Mattel Aquarius</td>
</tr>
<tr>
<td>Low</td>
<td>7</td>
<td>HP 2620/2640, Ohio Scientific, Robotron KC</td>
</tr>
</tbody>
</table>

Should the Script Ad Hoc or UTC determine that only a subset of the proposed characters are worth encoding, we will produce a revised proposal limited to that subset.

**10. Character names.** At least since the 1970s, international SDOs such as ECMA and national bodies such as ANSI and BSI have assigned names to the elements of coded character sets. By contrast, vendors of microcomputers, and even the developers of the teletext standard, tended to provide at best a code chart or image of a screen showing the character set, usually without names. We have attempted to invent names for these characters that are meaningful, unique, and conformant to WG2 and UTC guidelines.

**11. Ordering and code point assignment.** The proposed characters are presented roughly in groups: characters present on multiple platforms, Sharp MZ characters, Mattel Aquarius characters, and so on. Although the exact order of these characters within their groups is not an overriding concern, it seems reasonable that the groups should be kept together.
The suggested code point assignments cover several blocks:

- Additional symbols representing control functions are shown with suggested code points within the existing Control Pictures block.
- Additional arrows which seemed to fit logically alongside other arrows are shown with suggested code points within the existing Supplemental Arrows-C block.
- Legacy characters present across multiple target platforms are shown with suggested code points within the existing Symbols for Legacy Computing block.
- Characters from the Sharp MZ series are shown with suggested code points at the start of a new block (1CC00..1CEAF, as suggested by the Roadmap Committee) that is as of yet unassigned and is near existing symbol blocks, with a placeholder block name, “Symbols for Legacy Computing Supplement.”
- Block octant characters and characters from the Mattel Aquarius are shown with suggested code points in the middle of the above-mentioned new block, starting at 1CD00.
- Characters from other platforms and separated block sextants are shown with suggested code points at the end of the above-mentioned new block, starting at 1CE00.

However, it is understood that final assignment of blocks, code points, and block and character names is completely at the discretion of UTC and/or WG2.

12. Implementation. To assist implementers of emulators and conversion tools with the variety of mechanisms discussed in these proposals—existing and new block graphics characters, control codes, ISO 6429 sequences for reverse video, and so forth—the group has developed an extensive set of mapping tables, providing suggested mappings from the legacy character sets to the UCS. These mapping tables are attached to the PDF version of this document. The group is also drafting a Unicode Technical Note to explain the mechanisms and recommended techniques for working with them.

13. Unicode character properties.

<table>
<thead>
<tr>
<th>Code Points</th>
<th>Characters</th>
</tr>
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<tbody>
<tr>
<td>2427</td>
<td>SYMBOL FOR DELETE SQUARE CHECKER BOARD FORM</td>
</tr>
<tr>
<td>2428</td>
<td>SYMBOL FOR DELETE RECTANGULAR CHECKER BOARD FORM</td>
</tr>
<tr>
<td>2429</td>
<td>SYMBOL FOR DELETE MEDIUM SHADE FORM</td>
</tr>
<tr>
<td>1CC00</td>
<td>UP-POINTING GO-KART</td>
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<tr>
<td>1CC01</td>
<td>RIGHT-POINTING GO-KART</td>
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<tr>
<td>1CC02</td>
<td>LEFT-POINTING STICK FIGURE</td>
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<tr>
<td>1CC03</td>
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<td>DOWN-POINTING STICK FIGURE</td>
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<tr>
<td>1CC11</td>
<td>PNP TRANSISTOR</td>
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1CDA4; BLOCK OCTANT-4568; So; 0; ON; ; ; ; ; ; ; N; ; ; ;
1CDA5; BLOCK OCTANT-14568; So; 0; ON; ; ; ; ; ; ; N; ; ; ;
1CDA6; BLOCK OCTANT-24568; So; 0; ON; ; ; ; ; ; ; N; ; ; ;
1CDA7; BLOCK OCTANT-124568; So; 0; ON; ; ; ; ; ; ; N; ; ; ;
1CDA8; BLOCK OCTANT-34568; So; 0; ON; ; ; ; ; ; ; N; ; ; ;
1CDA9; BLOCK OCTANT-134568; So; 0; ON; ; ; ; ; ; ; N; ; ; ;
1CDAA; BLOCK OCTANT-234568; So; 0; ON; ; ; ; ; ; ; N; ; ; ;
1CDB0; BLOCK OCTANT-1234568; So; 0; ON; ; ; ; ; ; ; N; ; ; ;
1CDA4; BLOCK OCTANT-4568; So; 0; ON; ; ; ; ; ; ; N; ; ; ;
1CDA5; BLOCK OCTANT-14568; So; 0; ON; ; ; ; ; ; ; N; ; ; ;
1CDA6; BLOCK OCTANT-24568; So; 0; ON; ; ; ; ; ; ; N; ; ; ;
1CDA7; BLOCK OCTANT-124568; So; 0; ON; ; ; ; ; ; ; N; ; ; ;
1CDA8; BLOCK OCTANT-34568; So; 0; ON; ; ; ; ; ; ; N; ; ; ;
1CDA9; BLOCK OCTANT-134568; So; 0; ON; ; ; ; ; ; ; N; ; ; ;
1CDAA; BLOCK OCTANT-234568; So; 0; ON; ; ; ; ; ; ; N; ; ; ;

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19
15. Disclaimer. All trademarks and registered trademarks mentioned herein are the property of their respective owners. The company and product names used in this document are for identification purposes only.
Specific symbols for delete

2427 ⌥ SYMBOL FOR DELETE SQUARE CHECKER BOARD FORM
   • symbol for delete in the Apple II character set
   • fills the bounding box of 002B +

2428 ⌦ SYMBOL FOR DELETE RECTANGULAR CHECKER BOARD FORM
   • symbol for delete in the TRS-80 character set
   • fills the bounding box of 0048 H

2429 ⌧ SYMBOL FOR DELETE MEDIUM SHADE FORM
   • symbol for delete in the Amstrad CPC character set, which also encodes 2592 □ separately
   • fills the character cell
   → 2592 □ medium shade
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Symbols for Legacy Computing Supplement

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Printed using UniBook™
(http://www.unicode.org/unibook/)

Printed: 24-Nov-2021
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Symbols for Legacy Computing Supplement

Game sprites
1CC00 ★ UP-POINTING GO-KART
1CC01 ★ RIGHT-POINTING GO-KART
1CC02 ★ LEFT-POINTING STICK FIGURE
1CC03 ★ RIGHT-POINTING STICK FIGURE
1CC04 ★ DOWN-POINTING STICK FIGURE

Ruler segments
1CC05 ▲ LOWER HORIZONTAL RULER SEGMENT
1CC06 ▼ RIGHT VERTICAL RULER SEGMENT
1CC07 ▼ LOWER RIGHT RULER SEGMENT

Schematic symbols
Designed to be used with light box drawing characters.
1CC08 ★ ANTENNA
1CC09 ★ HORIZONTAL RESISTOR SEGMENT
1CC10 ★ RESISTOR SEGMENT
1CC11 ★ LEFT THIRD INDUCTOR
1CC12 ★ MIDDLE THIRD INDUCTOR
1CC13 ★ RIGHT THIRD INDUCTOR
1CC14 ★ LEFT-POINTING DIODE
1CC15 ★ RIGHT-POINTING DIODE
1CC16 ★ NPN TRANSISTOR
1CC17 ★ PNP TRANSISTOR
1CC18 ★ RECEPTACLE
1CC19 ★ LOGIC GATE OR
1CC1A ★ LOGIC GATE BUFFER

Box drawing characters
1CC1B ★ BOX DRAWINGS LIGHT HORIZONTAL AND UPPER RIGHT
1CC1C ★ BOX DRAWINGS LIGHT HORIZONTAL AND LOWER RIGHT
1CC1D ★ BOX DRAWINGS LIGHT TOP AND UPPER LEFT
1CC1E ★ BOX DRAWINGS LIGHT BOTTOM AND LOWER LEFT
1CC1F ★ BOX DRAWINGS DOUBLE DIAGONAL UPPER RIGHT TO LOWER LEFT
1CC20 ★ BOX DRAWINGS DOUBLE DIAGONAL UPPER LEFT TO LOWER RIGHT

Separated mosaic terminal graphic characters
The term "quadrant" refers to block mosaics divided into four parts.
1CC21 ★ SEPARATED BLOCK QUADRANT-1
1CC22 ★ SEPARATED BLOCK QUADRANT-2
1CC23 ★ SEPARATED BLOCK QUADRANT-12
1CC24 ★ SEPARATED BLOCK QUADRANT-3
1CC25 ★ SEPARATED BLOCK QUADRANT-13
1CC26 ★ SEPARATED BLOCK QUADRANT-23
1CC27 ★ SEPARATED BLOCK QUADRANT-123
1CC28 ★ SEPARATED BLOCK QUADRANT-4
1CC29 ★ SEPARATED BLOCK QUADRANT-14
1CC2A ★ SEPARATED BLOCK QUADRANT-24
1CC2B ★ SEPARATED BLOCK QUADRANT-124
1CC2C ★ SEPARATED BLOCK QUADRANT-34
1CC2D ★ SEPARATED BLOCK QUADRANT-134
1CC2E ★ SEPARATED BLOCK QUADRANT-234
1CC2F ★ SEPARATED BLOCK QUADRANT-1234

Circle segments
1CC30 ★ UPPER LEFT TWELFTH CIRCLE
1CC31 ★ UPPER CENTRE LEFT TWELFTH CIRCLE
1CC32 ★ UPPER CENTRE RIGHT TWELFTH CIRCLE
1CC33 ★ UPPER RIGHT TWELFTH CIRCLE
1CC34 ★ UPPER MIDDLE LEFT TWELFTH CIRCLE
1CC35 ★ UPPER LEFT QUARTER CIRCLE
1CC36 ★ UPPER RIGHT QUARTER CIRCLE
1CC37 ★ UPPER MIDDLE RIGHT TWELFTH CIRCLE
1CC38 ★ LOWER MIDDLE LEFT TWELFTH CIRCLE
1CC39 ★ LOWER LEFT QUARTER CIRCLE
1CC3A ★ LOWER RIGHT QUARTER CIRCLE
1CC3B ★ LOWER MIDDLE RIGHT TWELFTH CIRCLE
1CC3C ★ LOWER TWELFTH CIRCLE
1CC3D ★ LOWER CENTRE LEFT TWELFTH CIRCLE
1CC3E ★ LOWER CENTRE RIGHT TWELFTH CIRCLE
1CC3F ★ LOWER TWELFTH CIRCLE

Fill characters
1CC40 ★ SPARSE HORIZONTAL FILL
1CC41 ★ SPARSE VERTICAL FILL
1CC42 ★ ORTHOGONAL CROSSHATCH FILL
1CC43 ★ DIAGONAL CROSSHATCH FILL
1CC44 ★ DENSE HORIZONTAL FILL
1CC45 ★ DENSE VERTICAL FILL
1CC46 ★ SPECKLE FILL FRAME-1
1CC47 ★ SPECKLE FILL FRAME-2

Game sprites
1CC48 ★ LEFT-FACING BASSINET
1CC49 ★ RIGHT-FACING BASSINET
1CC4A ★ FLYING SAUCER WITH BEAMS
Symbols for Legacy Computing Supplement

**Faces**

- 1CCA6 ː UPPER LEFT QUADRANT FACE WITH OPEN EYES
- 1CCA7 ː UPPER RIGHT QUADRANT FACE WITH OPEN EYES
- 1CCA8 ː UPPER LEFT QUADRANT FACE WITH CLOSED EYES
- 1CCA9 ː UPPER RIGHT QUADRANT FACE WITH CLOSED EYES
- 1CCAA ː LOWER LEFT QUADRANT SMILING FACE
- 1CCAB ː LOWER RIGHT QUADRANT SMILING FACE
- 1CCAC ː LOWER LEFT QUADRANT NEUTRAL FACE
- 1CCAD ː LOWER RIGHT QUADRANT NEUTRAL FACE
- 1CCAЕ ː LOWER LEFT QUADRANT FACE WITH OPEN MOUTH
- 1CCAF ː LOWER RIGHT QUADRANT FACE WITH OPEN MOUTH
- 1CCB0 ː LOWER LEFT QUADRANT FROWNING FACE
- 1CCB1 ː LOWER RIGHT QUADRANT FROWNING FACE

**Icons**

- 1CCB2 ː UPPER LEFT QUADRANT TELEVISION
- 1CCB3 ː UPPER RIGHT QUADRANT TELEVISION
- 1CCB4 ː LOWER LEFT QUADRANT TELEVISION
- 1CCB5 ː LOWER RIGHT QUADRANT TELEVISION
- 1CCB6 ː UPPER LEFT QUADRANT MICROCOMPUTER
- 1CCB7 ː UPPER RIGHT QUADRANT MICROCOMPUTER
- 1CCB8 ː LOWER LEFT QUADRANT MICROCOMPUTER
- 1CCB9 ː LOWER RIGHT QUADRANT MICROCOMPUTER

**Chess symbols**

*May appear as white or black chess pieces.*

- 1CCBА ː UPPER LEFT QUADRANT CHESS KING
  → 2654 ☐ white chess king
  → 265A ☒ black chess king
- 1CCBВ ː UPPER RIGHT QUADRANT CHESS KING
- 1CCBС ː LOWER LEFT QUADRANT CHESS KING
- 1CCBД ː LOWER RIGHT QUADRANT CHESS KING
- 1CCБE ː UPPER LEFT QUADRANT CHESS QUEEN
  → 2655 ☠ white chess queen
  → 265B ☭ black chess queen
- 1CCВF ː UPPER RIGHT QUADRANT CHESS QUEEN
- 1CCС0 ː LOWER LEFT QUADRANT CHESS QUEEN
- 1CCС1 ː LOWER RIGHT QUADRANT CHESS QUEEN
- 1CCС2 ː UPPER LEFT QUADRANT CHESS ROOK
  → 2656 ☪ white chess rook
  → 265C ☬ black chess rook
- 1CCС3 ː UPPER RIGHT QUADRANT CHESS ROOK
- 1CCС4 ː LOWER LEFT QUADRANT CHESS ROOK
- 1CCС5 ː LOWER RIGHT QUADRANT CHESS ROOK
- 1CCС6 ː UPPER LEFT QUADRANT CHESS BISHOP
  → 2657 ☯ white chess bishop
  → 265D ☯ black chess bishop
- 1CCС7 ː UPPER RIGHT QUADRANT CHESS BISHOP
- 1CCС8 ː LOWER LEFT QUADRANT CHESS BISHOP
- 1CCС9 ː LOWER RIGHT QUADRANT CHESS BISHOP

**Outlined ASCII digits**

- 1CCF0 ː OUTLINED DIGIT ZERO
- 1CCF1 ː OUTLINED DIGIT ONE
- 1CCF2 ː OUTLINED DIGIT TWO
- 1CCF3 ː OUTLINED DIGIT THREE
- 1CCF4 ː OUTLINED DIGIT FOUR
- 1CCF5 ː OUTLINED DIGIT FIVE
- 1CCF6 ː OUTLINED DIGIT SIX
- 1CCF7 ː OUTLINED DIGIT SEVEN
- 1CCF8 ː OUTLINED DIGIT EIGHT
- 1CCF9 ː OUTLINED DIGIT NINE

**Block mosaic terminal graphic characters**

*The term "octant" refers to block mosaics divided into eight parts.*

- 1CD00 ː BLOCK OCTANT-3
- 1CD01 ː BLOCK OCTANT-23
- 1CD02 ː BLOCK OCTANT-123
Game sprites
The term "frame" used here refers to frames of an animation.

1CD8D | BLOCK OCTANT-13458
1CD8E | BLOCK OCTANT-23458
1CD8F | BLOCK OCTANT-123458
1CD90 | BLOCK OCTANT-168
1CD91 | BLOCK OCTANT-268
1CD92 | BLOCK OCTANT-123458
1CD93 | BLOCK OCTANT-368
1CD94 | BLOCK OCTANT-2368
1CD95 | BLOCK OCTANT-12368
1CD96 | BLOCK OCTANT-468
1CD97 | BLOCK OCTANT-1468
1CD98 | BLOCK OCTANT-12468
1CD99 | BLOCK OCTANT-3468
1CD9A | BLOCK OCTANT-13468
1CD9B | BLOCK OCTANT-23468
1CD9C | BLOCK OCTANT-568
1CD9D | BLOCK OCTANT-1568
1CD9E | BLOCK OCTANT-2568
1CD9F | BLOCK OCTANT-12568
1CDA0 | BLOCK OCTANT-3568
1CDA1 | BLOCK OCTANT-13568
1CDA2 | BLOCK OCTANT-23568
1CDA3 | BLOCK OCTANT-123568
1CDA4 | BLOCK OCTANT-4568
1CDA5 | BLOCK OCTANT-14568
1CDA6 | BLOCK OCTANT-24568
1CDA7 | BLOCK OCTANT-124568
1CDA8 | BLOCK OCTANT-34568
1CDA9 | BLOCK OCTANT-134568
1CDAA | BLOCK OCTANT-234568
1CDAB | BLOCK OCTANT-1234568
1CDAC | BLOCK OCTANT-178
1CDD4 | BLOCK OCTANT-278
1CDAE | BLOCK OCTANT-1278
1CDF0 | BLOCK OCTANT-378
1CDB0 | BLOCK OCTANT-1378
1CDB1 | BLOCK OCTANT-2378
1CDB2 | BLOCK OCTANT-12378
1CDB3 | BLOCK OCTANT-478
1CDB4 | BLOCK OCTANT-1478
1CDB5 | BLOCK OCTANT-2478
1CDB6 | BLOCK OCTANT-12478
1CDB7 | BLOCK OCTANT-3478
1CDB8 | BLOCK OCTANT-13478
1CDB9 | BLOCK OCTANT-23478
1CDBA | BLOCK OCTANT-123478
1CDBB | BLOCK OCTANT-578
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1CDBE | BLOCK OCTANT-12578
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1CDDA | BLOCK OCTANT-123578
1CDDC | BLOCK OCTANT-678
1CDDD | BLOCK OCTANT-2678
1CDE0 | BLOCK OCTANT-12678
1CDE1 | BLOCK OCTANT-3678
1CDE2 | BLOCK OCTANT-13678
1CDE3 | BLOCK OCTANT-23678
1CDE4 | BLOCK OCTANT-1345678
1CDE5 | BLOCK OCTANT-1245678
1CDE6 | TOP HALF STANDING PERSON
1CDE7 | BOTTOM HALF STANDING PERSON
1CDE8 | TOP HALF RIGHT-FACING RUNNER FRAME-1
1CDE9 | BOTTOM HALF RIGHT-FACING RUNNER FRAME-1
1CDEA | TOP HALF RIGHT-FACING RUNNER FRAME-2
1CDEB | BOTTOM HALF RIGHT-FACING RUNNER FRAME-2
1CDEC | TOP HALF LEFT-FACING RUNNER FRAME-1
1CDED | BOTTOM HALF LEFT-FACING RUNNER FRAME-1
1CDEE | TOP HALF LEFT-FACING RUNNER FRAME-2
1CDEF | BOTTOM HALF LEFT-FACING RUNNER FRAME-2
1CDF0 | TOP HALF FORWARD-FACING RUNNER
1CDF1 | BOTTOM HALF FORWARD-FACING RUNNER FRAME-1
1CDF2 | BOTTOM HALF FORWARD-FACING RUNNER FRAME-2
1CDF3 | BOTTOM HALF FORWARD-FACING RUNNER FRAME-3
1CDF4 | BOTTOM HALF FORWARD-FACING RUNNER FRAME-4
1CDF5 | MOON LANDER
1CDF6 | TOP HALF FLAILING ROBOT FRAME-1
• bottom half is 1CDF4
1CDF7 | TOP HALF FLAILING ROBOT FRAME-2
1CDF8 | DOWN-POINTING AIRPLANE
→ 1F6E7 ▲ up-pointing airplane
1CDF9 | LEFT-POINTING AIRPLANE
→ 2708 → airplane
1CDA0 | SMALL UP-POINTING AIRPLANE
1CDA1 | UP-POINTING FROG
• represents the frog in the Mattel Aquarius port of Frogger
→ 1F438 ▲ frog face
1CDFC | DOWN-POINTING FROG
1CDFD | EXPLOSION FRAME-1
1CDEF | EXPLOSION FRAME-2
1CDFF | EXPLOSION FRAME-3

Terminal graphic characters
1CE00 | RIGHT HALF AND LEFT HALF WHITE CIRCLE
1CE01 | LOWER HALF AND UPPER HALF WHITE CIRCLE
1CE02 | EXPLOSION AT HORIZON
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<td>Heavy white square containing black very small square</td>
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<td>Large type piece stem</td>
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</tr>
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<td>1CE2F</td>
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<tr>
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<td>Large type piece upper half vertex of W</td>
</tr>
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<td>Large type piece centre of Y</td>
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<td>Large type piece centre of Z with crossbar</td>
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**Dashed lines**

- Left half triple dash horizontal
- Box drawings light triple dash horizontal

**Lines with tick marks**

- Horizontal line with tick mark
- Left half horizontal line with three tick marks
- Right half horizontal line with three tick marks
- Horizontal line with three tick marks
- Lower half vertical line with three tick marks
- Upper half vertical line with three tick marks
- Vertical line with three tick marks

**Box drawing characters**

- Box drawings light vertical and top right
- Box drawings light vertical and bottom right
- Box drawings light vertical and top left

**Large type pieces**

*Used to generate large text headlines on HP terminals.*

- Large type piece upper left arc
- Large type piece upper left corner
- Large type piece upper terminal
- Large type piece upper left crotch
- Large type piece left arm
- Large type piece crossbar
- Large type piece crossbar with lower stem
- Large type piece upper half vertex of M
- Large type piece diagonal lower left

**Separated mosaic terminal graphic characters**

The term "sextant" refers to block mosaics divided into six parts.

- Separated block sextant-1
- Separated block sextant-2
- Separated block sextant-12
- Separated block sextant-3
- Separated block sextant-13
- Separated block sextant-23
- Separated block sextant-123
- Separated block sextant-4
Symbols for Legacy Computing Supplement

<table>
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<th>Description</th>
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**Block elements**

- 1CE90: UPPER LEFT ONE SIXTEENTH BLOCK
- 1CE91: UPPER CENTRE LEFT ONE SIXTEENTH BLOCK
- 1CE92: UPPER CENTRE RIGHT ONE SIXTEENTH BLOCK
- 1CE93: UPPER RIGHT ONE SIXTEENTH BLOCK
- 1CE94: UPPER MIDDLE LEFT ONE SIXTEENTH BLOCK
- 1CE95: UPPER MIDDLE CENTRE LEFT ONE SIXTEENTH BLOCK
- 1CE96: UPPER MIDDLE CENTRE RIGHT ONE SIXTEENTH BLOCK
- 1CE97: UPPER MIDDLE RIGHT ONE SIXTEENTH BLOCK
- 1CE98: LOWER MIDDLE LEFT ONE SIXTEENTH BLOCK
- 1CE99: LOWER MIDDLE CENTRE LEFT ONE SIXTEENTH BLOCK
- 1CE9A: LOWER MIDDLE CENTRE RIGHT ONE SIXTEENTH BLOCK
- 1CE9B: LOWER MIDDLE RIGHT ONE SIXTEENTH BLOCK
- 1CE9C: LOWER LEFT ONE SIXTEENTH BLOCK
- 1CE9D: LOWER CENTRE LEFT ONE SIXTEENTH BLOCK
- 1CE9E: LOWER CENTRE RIGHT ONE SIXTEENTH BLOCK
- 1CE9F: LOWER RIGHT ONE SIXTEENTH BLOCK
- 1CEA0: RIGHT HALF LOWER ONE QUARTER BLOCK
- 1CEA1: RIGHT THREE QUARTERS LOWER ONE QUARTER BLOCK
- 1CEA2: LEFT THREE QUARTERS LOWER ONE QUARTER BLOCK
- 1CEA3: LEFT HALF LOWER ONE QUARTER BLOCK
- 1CEA4: LOWER HALF LEFT ONE QUARTER BLOCK
- 1CEA5: LOWER THREE QUARTERS LEFT ONE QUARTER BLOCK
- 1CEA6: UPPER THREE QUARTERS LEFT ONE QUARTER BLOCK
- 1CEA7: UPPER HALF LEFT ONE QUARTER BLOCK
- 1CEA8: LEFT HALF UPPER ONE QUARTER BLOCK
- 1CEA9: LEFT THREE QUARTERS UPPER ONE QUARTER BLOCK
- 1CEAA: RIGHT THREE QUARTERS UPPER ONE QUARTER BLOCK
- 1CEAB: RIGHT HALF UPPER ONE QUARTER BLOCK
- 1CEAC: UPPER HALF RIGHT ONE QUARTER BLOCK
- 1CEAD: UPPER THREE QUARTERS RIGHT ONE QUARTER BLOCK
- 1CEE: LOWER THREE QUARTERS RIGHT ONE QUARTER BLOCK
- 1CEAF: LOWER HALF RIGHT ONE QUARTER BLOCK
- 1CEAF: LOWER RIGHT ONE QUARTER BLOCK
**Arrows for legacy computing**

1F8B3  🔻 **DOWNWARDS BLACK ARROW TO BAR**
→ 2913 ▼ downwards arrow to bar
→ 2B07 ▼ downwards black arrow
→ 2B73 ▼ downwards triangle-headed arrow to bar

1F8B4  ⌐ **NEGATIVE SQUARED LEFTWARDS ARROW**
→ 2190 ← leftwards arrow

1F8B5  ⌐ **NEGATIVE SQUARED UPWARDS ARROW**
→ 2191 ↑ upwards arrow

1F8B6  ⌐ **NEGATIVE SQUARED RIGHTWARDS ARROW**
→ 2192 → rightwards arrow

1F8B7  ⌐ **NEGATIVE SQUARED DOWNWARDS ARROW**
→ 2193 ↓ downwards arrow

These arrows complement the set in the range 21A4-21A7.

1F8B8  ↘ **NORTH WEST ARROW FROM BAR**

1F8B9  ↗ **NORTH EAST ARROW FROM BAR**

1F8BA  ↘ **SOUTH EAST ARROW FROM BAR**

1F8BB  ↗ **SOUTH WEST ARROW FROM BAR**
Symbols for Legacy Computing

Terminal graphic characters
1FBCB ☐ WHITE CROSS MARK • 274C ☐ cross mark
1FBCC ☘ RAISED SMALL LEFT SQUARE BRACKET □ black small up-pointing chevron
1FBCD ☕ BLACK SMALL UP-POINTING CHEVRON → 1F835 ☒ upwards finger-post arrow
→ 1FBCA ☐ white up-pointing chevron

Block elements
1FBCE ☐ LEFT TWO THIRDS BLOCK
1FBF ☐ LEFT ONE THIRD BLOCK

Character cell diagonals
1FBD0 \ BOX DRAWINGS LIGHT DIAGONAL MIDDLE RIGHT TO LOWER LEFT
1FBD1 \ BOX DRAWINGS LIGHT DIAGONAL UPPER RIGHT TO MIDDLE LEFT
1FBD2 \ BOX DRAWINGS LIGHT DIAGONAL UPPER LEFT TO MIDDLE RIGHT
1FBD3 \ BOX DRAWINGS LIGHT DIAGONAL MIDDLE LEFT TO LOWER RIGHT
1FBD4 \ BOX DRAWINGS LIGHT DIAGONAL MIDDLE RIGHT TO LOWER CENTRE
1FBD5 \ BOX DRAWINGS LIGHT DIAGONAL UPPER CENTRE TO LOWER RIGHT
1FBD6 \ BOX DRAWINGS LIGHT DIAGONAL UPPER CENTRE TO LOWER LEFT
1FBD7 \ BOX DRAWINGS LIGHT DIAGONAL UPPER CENTRE TO MIDDLE LEFT
1FBD8 \ BOX DRAWINGS LIGHT DIAGONAL UPPER LEFT TO MIDDLE TO LOWER RIGHT
1FBD9 \ BOX DRAWINGS LIGHT DIAGONAL UPPER LEFT TO MIDDLE TO LOWER LEFT
1FBD10 BOX DRAWINGS LIGHT DIAGONAL LOWER LEFT TO MIDDLE CENTRE TO LOWER LEFT
1FBD11 BOX DRAWINGS LIGHT DIAGONAL LOWER LEFT TO MIDDLE CENTRE TO LOWER RIGHT
1FBD12 BOX DRAWINGS LIGHT DIAGONAL LOWER LEFT TO MIDDLE TO LOWER RIGHT
1FBD13 BOX DRAWINGS LIGHT DIAGONAL LOWER LEFT TO MIDDLE TO LOWER LEFT
1FBD14 BOX DRAWINGS LIGHT DIAGONAL LOWER LEFT TO MIDDLE CENTRE TO LOWER RIGHT
1FBD15 BOX DRAWINGS LIGHT DIAGONAL LOWER LEFT TO MIDDLE CENTRE TO LOWER LEFT
1FBD16 BOX DRAWINGS LIGHT DIAGONAL LOWER LEFT TO MIDDLE TO LOWER LEFT
1FBD17 BOX DRAWINGS LIGHT DIAGONAL LOWER LEFT TO MIDDLE TO LOWER RIGHT
1FBD18 BOX DRAWINGS LIGHT DIAGONAL LOWER LEFT TO MIDDLE TO LOWER LEFT
1FBD19 BOX DRAWINGS LIGHT DIAGONAL LOWER LEFT TO MIDDLE TO LOWER RIGHT
1FBD1A BOX DRAWINGS LIGHT DIAGONAL LOWER LEFT TO MIDDLE TO LOWER LEFT
1FBD1B BOX DRAWINGS LIGHT DIAGONAL LOWER LEFT TO MIDDLE TO LOWER RIGHT
1FBD1C BOX DRAWINGS LIGHT DIAGONAL LOWER LEFT TO MIDDLE TO LOWER LEFT
1FBD1D BOX DRAWINGS LIGHT DIAGONAL LOWER LEFT TO MIDDLE TO LOWER RIGHT
1FBD1E BOX DRAWINGS LIGHT DIAGONAL LOWER LEFT TO MIDDLE TO LOWER LEFT
1FBD1F BOX DRAWINGS LIGHT DIAGONAL LOWER LEFT TO MIDDLE TO LOWER RIGHT

Geometric shapes
1FBE0 ⁀ TOP JUSTIFIED LOWER HALF WHITE CIRCLE → 25E1 ☾ lower half circle
1FBE1 ☼ RIGHTJUSTIFIED LEFT HALF WHITE CIRCLE → 1F907 ☾ left half circle
1FBE2 ☽ BOTTOMJUSTIFIED UPPER HALF WHITE CIRCLE
→ 2312 ☽ arc
→ 25E0 ☽ upper half circle
1FBE3 ☹ LEFT JUSTIFIED RIGHT HALF WHITE CIRCLE
1FBE4 ☻ UPPER CENTRE ONE QUARTER BLOCK
1FBE5 ☼ LOWER CENTRE ONE QUARTER BLOCK
1FBE6 ☽ MIDDLE LEFT ONE QUARTER BLOCK
1FBE7 ☻ MIDDLE RIGHT ONE QUARTER BLOCK
1FBE8 ☼ TOP JUSTIFIED LOWER HALF BLACK CIRCLE
→ 2BCB ☼ bottom half black circle
1FBE9 ☽ RIGHT JUSTIFIED LOWER HALF BLACK CIRCLE
→ 25D6 ☽ left half black circle
1FBEA ☼ BOTTOM JUSTIFIED LOWER HALF BLACK CIRCLE
→ 2BCA ☼ top half black circle
1FBEB ☽ LEFT JUSTIFIED LOWER HALF BLACK CIRCLE
→ 25D7 ☽ right half black circle
Figures.

Figures showing legacy character charts or “dumps” are presented first, followed by examples of usage and other illustrations. Screenshots showing the number of search results for each platform on Google Search, Bing Search, and Google Video are presented last.

Figure 1. A character chart of the Amstrad CPC English character set, with \texttt{U+1CC57 UP-POINTING ROCKET SHIP}, \texttt{U+1CC63 DOWN-POINTING ATOMIC BOMB}, and \texttt{U+1CC64 MUSHROOM CLOUD} highlighted in red. (CPCWiki)
Figure 2. Character dump for the Apple II GS shown on a Macintosh-based emulator, with U+2427 symbol for delete square checker board form highlighted in red.

Figure 3. Dumps of HP 2640 series terminal character ROMs. From left to right: uppercase, lowercase, math, line drawing, and “large type” character sets. (CuriousMarc.com)
Figure 4. Kaypro II character set. Note the $2 \times 4$ block semigraphics above ASCII.

Figure 5. Mattel Aquarius character set. Several of the glyphs in this collection were identified and included in the previous proposal; the remaining glyphs are proposed here.
Figure 6. A character chart of the Ohio Scientific character set.

Figure 7. A character chart of the Robotron Z9001 character set.
Figure 8. Character charts of the Sharp MZ Japanese character set, with differences between primary (uppercase, single box drawing diagonals, and katakana) and alternate (lowercase, double box drawing diagonals, and hiragana) highlighted in blue.

Figure 9. Character charts of the Sharp MZ European character set, with differences between Japanese and European primary sets highlighted in blue. The alternate set is entirely different.
Figure 10. A printed character chart of the Sharp X1 character set. (Sharp)

Figure 11. Character dump for the TRS-80 Model III shown on a Macintosh-based emulator, with U+1FBCB WHITE CROSS MARK highlighted in red.
Figure 12. Examples of art created using the Sharp MZ Japanese character set. (Text-Mode.org)

Figure 13. Title screen of a Sharp MZ program using outlined letters in the “UR SOFT” logo.
Figure 14. Hanafuda cards drawn using Sharp MZ characters.
Figure 15. Screen capture of a Windows-based editor for Sharp MZ art. (Text-Mode.org)

Figure 16. Screen capture of the Mattel Aquarius game *Phrogee* from 1983, with U+1CDFB UP-POINTING FROG highlighted in red. (vdSteenoven.com)
GRAPHICS CHARACTERS

Each of the character positions on the screen occupies the same area as eight pixels (4 high, 2 wide). Thus, pixels can be addressed in groups of eight at a time. To set pixels in a character position, the cursor is moved to that position, and then a byte is sent to the console output. This byte must have the high-order bit set to 1 to distinguish it from normal characters. The remaining seven bits are used to set 7 of the 8 pixels.

i.e., to write these pixels....

As shown above, pixel #7 is off. To write a pixel with it on, send the inverse video command (ESC,B,0), then output the inverse for bits 0 through 6, i.e., 10000000b would print a blank graphics character; (ESC,B,0),1000000b would print a solid character.

With video mode on, 2 bytes are required for each graphic character. The Least Significant Bit of byte 1 controls pixel #7. The rest of the characters are controlled by byte #2 in the normal manner.

Figure 17. Illustration of the use of semigraphics to plot “pixels” on the Kaypro by displaying the appropriate 2 x 4 block graphic. (Kaypro)
Figure 18. Screen shot of text files containing semigraphics characters being displayed in a Java-based Kaypro 10 emulator.

Figure 19. Screen shot of a Star Trek game running in a Java-based Kaypro emulator. Note the use of semigraphics for borders, in the manner of box-drawing characters. (Miller)
Figure 20. Image of an HP terminal with “large type” characters highlighted in red. (HP Journal)

Figure 21. Excerpt from an HP terminal manual demonstrating the use of “large type” and math characters. (Hewlett-Packard Company)
Figure 22. Search results for the Amstrad CPC.

Figure 23. Search results for the Apple II.
**Figure 24.** Search results for the HP 2640 series terminal.

**Figure 25.** Search results for the HP 2620 series terminal.
Figure 26. Search results for the Kaypro.

Figure 27. Search results for the Mattel Aquarius.
Figure 28. Search results for the Ohio Scientific.

Figure 29. Search results for the Robotron KC.
Figure 30. Search results for the Sharp MZ.

Figure 31. Search results for the Sharp X1.
Figure 32. Search results for the TRS-80.
A. Administrative

1. Title
   Proposal to add further characters from legacy computers and teletext to the UCS
2. Requester's name
   Terminals Working Group (Rebecca Bettencourt et al.)
3. Requester type (Member body/Liaison/Individual contribution)
   Individual contribution.
4. Submission date
   2021-12-20
5. Requester’s reference (if applicable)
6. Choose one of the following:
   6a. This is a complete proposal
      Yes.
   6b. More information will be provided later
      No.

B. Technical - General

1. Choose one of the following:
   1a. This proposal is for a new script (set of characters)
      Yes.
   1b. Proposed name of script
      Symbols for Legacy Computing Supplement.
   1c. The proposal is for addition of character(s) to an existing block
      No.
   1d. Name of the existing block
   2. Number of characters in proposal
      731.
   3. Proposed category (A-Contemporary; B.1-Specialized (small collection); B.2-Specialized (large collection); C-Major extinct; D-Attested extinct; E-Minor extinct; F-Archaic Hieroglyphic or Ideographic; G-Obscure or questionable usage symbols)
      Category B.1.
   4a. Is a repertoire including character names provided?
      Yes.
   4b. If YES, are the names in accordance with the “character naming guidelines” in Annex L of P&P document?
      Yes.
   4c. Are the character shapes attached in a legible form suitable for review?
      Yes.
   5a. Who will provide the appropriate computerized font (ordered preference: TrueType, or PostScript format) for publishing the standard?
      Rebecca Bettencourt.
   5b. If available now, identify source(s) for the font (include address, e-mail, ftp-site, etc.) and indicate the tools used:
      Rebecca Bettencourt, FontForge.
   6a. Are references (to other character sets, dictionaries, descriptive texts, etc.) provided?
      Yes.
   6b. Are published examples of use (such as samples from newspapers, magazines, or other sources) of proposed characters attached?
      Yes.
   7. Does the proposal address other aspects of character data processing (if applicable) such as input, presentation, sorting, searching, indexing, transliteration, etc. (if yes please enclose information)?
      Yes.
   8. Submitters are invited to provide any additional information about Properties of the proposed Character(s) or Script that will assist in correct understanding of and correct linguistic processing of the proposed character(s) or script.
      See above.

C. Technical - Justification

1. Has this proposal for addition of character(s) been submitted before? If YES, explain.
   No.
2a. Has contact been made to members of the user community (for example: National Body, user groups of the script or characters, other experts, etc.)?
   Yes.
2b. If YES, with whom?
   r/Amstrad (Amstrad CPC subreddit); Sharp MZ user community
2c. If YES, available relevant documents

3. Information on the user community for the proposed characters (for example: size, demographics, information technology use, or publishing use) is included?
   Contemporary use by specialists and hobbyists.

4a. The context of use for the proposed characters (type of use; common or rare)
   Rare.
4b. Reference

5a. Are the proposed characters in current use by the user community?
   Yes.
5b. If YES, where?
   Worldwide, but particularly in North America, Europe, and Japan.

6a. After giving due considerations to the principles in the P&P document, must the proposed characters be entirely in the BMP?
   No.
6b. If YES, is a rationale provided?
   Yes.
6c. If YES, reference

7. Should the proposed characters be kept together in a contiguous range (rather than being scattered)?
   Mostly yes, but this is not required.

8a. Can any of the proposed characters be considered a presentation form of an existing character or character sequence?
   Yes, the “outlined” digits and uppercase Latin letters can be considered presentation forms of U+0030 through U+0039 and U+0041 through U+005A, respectively.
8b. If YES, is a rationale for its inclusion provided?
   Yes.
8c. If YES, reference

Included in proposal.
9a. Can any of the proposed characters be encoded using a composed character sequence of either existing characters or other proposed characters?
   No.
9b. If YES, is a rationale for its inclusion provided?
   Yes.
9c. If YES, reference

10a. Can any of the proposed character(s) be considered similar (in appearance or function) to an existing character?
   Yes.
10b. If YES, is a rationale for its inclusion provided?
   Yes.
10c. If YES, reference

The proposal document describes new semigraphics, some of which are superficially similar to existing characters.
11a. Does the proposal include use of combining characters and/or the use of composite sequences (see clauses 4.12 and 4.14 in ISO/IEC 10646-1:2000)?
   No.
11b. If YES, is a rationale for such use provided?
   Yes.
11c. If YES, reference
11d. Is a list of composite sequences and their corresponding glyph images (graphic symbols) provided?
   Yes.
11e. If YES, reference

12a. Does the proposal contain characters with any special properties such as control function or similar semantics?
   No.
12b. If YES, describe in detail (include attachment if necessary)

13a. Does the proposal contain any Ideographic compatibility character(s)?
   No.
13b. If YES, is the equivalent corresponding unified ideographic character(s) identified?