# The Symbol Font wasy 

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The font wasy contains all lasy characters, and a lot more symbols. New characters were modified from the mf files of the standard $\mathrm{T}_{\mathrm{E}} \mathrm{f}$ fonts, and many were designed from scratch.

The first version was released in 1990. Metafont sources for $5-10 \mathrm{pt}$ and a bold and slanted 10 pt font are available in the present version. An extension to PLAIN-TEX for using the fonts is included in the file WASYFONT. tex.
This can probably be used in $\mathrm{LAT}_{\mathrm{E}} \mathrm{X}$ documents, but a new $\mathrm{IAT}_{\mathrm{E}} \mathrm{X}$ format with the bindings already included and with wasy replacing the lasy font would be the superiour solution. This version includes all lasy characters at the proper codes (causing some incompatibilities with version 1 of wasy) to make such a procedure easy.

The file WASYFONT. 2 contains substitutes for some macros of WASYFONT. tex to be used at installations, that do not support the wasy fonts.
Some characters make sense in slanted or boldface form (only available at 10pt, although scaled fonts can be defined by the user). These are included in slanted text, if instead of \sl the command \wsl is used, and in bold text, if instead of $\backslash \mathrm{bf}$ the command \wbf is used. Analogue commands for $\mathrm{LAT}_{\mathrm{E}} \mathrm{X}$ are easy to define, too.

Symbols (not letters) are defined in WASYFONT.tex as boxes, which simplifies their use in math-mode, but the $\backslash /$ for italic correction for the slanted characters will not work after a symbol. If this feature is required, the \hbox\{...\} should be removed from the definition.
A list of characters with their bindings in WASYFONT.tex follows. Some macros are actually compositions of several characters useful in the given context. Macros using symbols which are already available from standard $\mathrm{T}_{\mathrm{E}} \mathrm{X}$ fonts are also included; these are marked with *.

```
general symbols
\male or \female of
\currency @ \cent &
\euro € \kreuz *
\smiley © \ \blacksmiley
\frownie () \sun 嫁
\checked \checkmark \brokenvert \
```

| \diameter | $\varnothing$ | \invdiameter | $Q$ |
| :---: | :---: | :---: | :---: |
| $\backslash$ phone | ర | $\backslash$ recorder | $\bigcirc$ |
| \clock | (1) | $\backslash$ permil | \% |
| $\backslash \mathrm{bell}$ | 4 | \ataribox | \% |
| $\backslash$ pointer | 5 | $\backslash \mathrm{lightning}$ | $\checkmark$ |
| \agem0 | v | $\backslash$ Paragraph | § |
| $\backslash$ lozenge | $\square$ | \applecmd | H |

music notes

| \eighthnote \& | \quarternote d |
| :--- | :--- |
| \halfnote d | \fullnote |
| \twonotes \& |  |

electrical engineering

| $\backslash \mathrm{AC}$ |  |
| :--- | :--- |
| $\backslash \mathrm{VHF}$ | $\approx$ |
| $\approx \mathrm{HF}$ | $\approx$ |

APL

| $\backslash$ APLup | $\triangle$ | $\backslash$ APLdown |
| :---: | :---: | :---: |
| $\backslash$ APLbox | $\square$ | $\backslash$ APLinv |
| $\backslash$ APLleftarrowbox | $\theta$ | $\backslash$ APLrightarrowbox |
| $\backslash$ APLuparrowbox | T | $\backslash$ APLdownarrowbox |
| $\backslash$ APLinput | $\square$ | $\backslash$ APLminus* |
| $\backslash$ APLlog | $\otimes$ | $\backslash$ APLstar |
| $\backslash$ APLvert* |  | $\backslash$ APLvert $\backslash \backslash$ APLdown |
| $\backslash$ APLnot* | $\sim$ | $\backslash$ APLnot $\{$ \APLdown\} |
| $\backslash$ APLnot $\{\backslash$ land $\}$ | A | $\backslash$ APLnot $\{\backslash$ lor $\}$ |
| $\backslash$ APLcirc* | - | $\backslash$ APLcirc\{ $\backslash$ bot $\}$ |
| \notbackslash* | $t$ | $\backslash$ notslash* |
| mment | a |  |

astronomy

| \ascnode | $\Omega$ | \descnode | $\mathcal{S}$ |
| :--- | :--- | :--- | :--- |
| \vernal | $\Upsilon$ | \astrosun* | $\odot$ |
| \newmoon | $\odot$ | \fullmoon | $\bigcirc$ |
| \leftmoon | $\wp$ | \rightmoon | $D$ |
| \mercury | $\wp$ | \venus | $\wp$ |
| \mars | $\bigcirc^{7}$ | \jupiter | 4 |
| \saturn | $\hbar$ | \uranus | $\oint$ |


| \neptune | \% |
| :--- | :--- | :--- |
| learth | す |

astrological symbols and zodiacal symbols

| \conjunction | $\sigma$ | \opposition | $0^{0}$ |
| :--- | :--- | :--- | :--- |
| \aries | $\uparrow$ | \libra | $\Omega$ |
| \taurus | $\ddots$ | \scorpio | $m$ |
| \gemini | $\Pi$ | \sagittarius | $\nearrow$ |
| \cancer | $\sigma$ | \capricornus | 6 |
| \leo | $\Omega$ | \aquarius | $\approx$ |
| \virgo | $m \infty$ | \pisces | $-($ |

geometrical shapes

| \hexstar | * | \varhexstar | * |
| :---: | :---: | :---: | :---: |
| \davidsstar | * | $\backslash$ APLstar | * |
| $\backslash$ Circle | $\bigcirc$ | \CIRCLE | $\bigcirc$ |
| \Leftcircle | 0 | \LEFTCIRCLE | 1 |
| $\backslash$ Rightcircle | D | \RIGHTCIRCLE | - |
| \LEFTcircle | (1) | $\backslash$ RIGHTcircle | - |
| \LEFTarrow | 4 | $\backslash$ RIGHTarrow | $\checkmark$ |
| \UParrow | $\triangle$ | \DOWNarrow | $\nabla$ |
| $\backslash$ Box | $\square$ | $\backslash$ APLbox | $\square$ |
| $\backslash \mathrm{XBox}$ | ® | $\backslash$ Bowtie | $\bowtie$ |
| $\backslash$ Diamond | $\diamond$ | \octagon | $\bigcirc$ |
| $\backslash$ hexagon | $\bigcirc$ | \varhexagon | $\bigcirc$ |
| \pentagon | $\bigcirc$ |  |  |

general math \& physics

| \varangle | $\Varangle$ | \$\invneg\$ | $\ulcorner$ |
| :--- | :--- | :--- | :--- |
| \diameter | $\varnothing$ | \therefore | $\therefore$ |
| \leftturn | $\circlearrowleft$ | \rightturn | $\circlearrowright$ |
| \photon | $\sim \sim$ | \gluon | 0000 |

math operators

| \$a\ocircle b\$ | $a \bigcirc b$ | \$a\logof b\$ | $a \otimes b$ |
| :--- | :--- | :--- | :--- |
| \$a\oplus* b\$ | $a \oplus b$ | \$a\otimes* b\$ | $a \otimes b$ |
| \$a\le* b\$ | $a \leq b$ | \$a\ge* b\$ | $a \geq b$ |
| \$a\apprle b\$ | $a \lesssim b$ | \$a\apprge b\$ | $a \gtrsim b$ |
| \$a\lhd b\$ | $a \triangleleft b$ | \$a\rhd b\$ | $a \triangleright b$ |
| \$a\unlhd b\$ | $a \unlhd b$ | \$a\unrhd b\$ | $a \unrhd b$ |


| \$a\LHD b\$ | $a$ ¢ $b$ | \$a\RHD b\$ | $a \triangleright b$ |
| :---: | :---: | :---: | :---: |
| \$a\sqsubset b\$ | $a \sqsubset b$ | \$a\sqsupset b\$ | $a \sqsupset b$ |
| \$a\sqsubseteq* b\$ | $a \sqsubseteq b$ | \$a\sqsupseteq* b\$ | $a \sqsupseteq b$ |
| \$a\propto* b\$ | $a \propto b$ | \$a\varpropto b\$ | $\propto b$ |
| \$a\leadsto b\$ | $a \sim b$ |  |  |

integrals (text style)
\$ Vvarint_a^b $\mathrm{f}(\mathrm{x}) \mathrm{dx} \$ \int_{a}^{b} f(x) d x \quad$ \$ iint_a^b $\mathrm{f}(\mathrm{x}) \mathrm{dx} \$ \quad \iint_{a}^{b} f(x) d x$
$\$ \backslash$ iint_a^b $\mathrm{f}(\mathrm{x}) \mathrm{dx} \$ \quad \iiint_{a}^{b} f(x) d x \quad \$ \backslash$ varoint_a^b $\mathrm{f}(\mathrm{x}) \mathrm{dx} \$ \oint_{a}^{b} f(x) d x$
$\$ \backslash$ oint_a^b $\mathrm{f}(\mathrm{x}) \mathrm{dx} \$ \quad \int_{a}^{b} f(x) d x$
integrals (display style)

## $\iiint \iiint \oint \int f$

With the control sequence \newpropto you can change the proportional sign to the thin wasy symbol $(\propto)$, which is more distinct from alpha $(\alpha)$ than the default symbol $(\propto)$.

With the control sequence \newint you can change the $\mathrm{T}_{\mathrm{E}} \mathrm{X}$ integrals from $\int, \oint$ to the vertical ones $\int, \oint$, in display:

$$
\int_{a}^{b} \rightarrow \int_{a}^{b}, \quad \oint_{C} \rightarrow \oint_{C}
$$

There are also a few letters in roman style added, although these and some symbols as $\mho, \%$ should be in a separate font, to be created in different styles like italic, sans serif etc. - the wasychr.mf source is prepared for that, and now has bold and slanted versions.

| \thorn | b b $p$ | \Thorn | ¢ ¢ P |
| :---: | :---: | :---: | :---: |
| \dh | ð ð ð | $\backslash \mathrm{Dh} *$ | Đ $\mathbf{\square}$ D |
| \inve | ә ə ə | \openo | $\bigcirc$ |
| \s | f ff | \z | 3 |

## Examples

"We provide the $\mathcal{N} \cdot \boldsymbol{J}$, you provide the $\odot$ "

 $\uparrow, \uparrow, \downarrow, \rightarrow, \leftarrow, \mathbf{\Delta}, \mathbf{\nabla}, \downarrow,\ulcorner, \neg, \ldots$
special characters on Atari STs: $\stackrel{\wedge}{\boldsymbol{\aleph}}, \checkmark, \oplus, \wedge, \curvearrowright, ə,\ulcorner, \neg, \oint, \ldots$
tube dimensions: $\varnothing 5 \mathrm{~mm}, d=0.5 \mathrm{~mm}, l=50 \mathrm{~mm}$
prices $1 \$ 2$ or or $0.95 €$ or $0.80 £$.
prices $1 \$ 2 \hat{c}$ or $0.95 €$ or $0.80 £$.
legal text: §§ 9-22 StVG, § 12 StVO oder §§ 9-22 StVG, § 12 StVO
Icelandic text: Ég veit bað ekki eða Ég veit pað ekki.
traditional typography: ligature $f_{3}=\beta$, fure to poffefs fatisfaction
simple phonetic notation: corner ['ko:nə], this [ðis], thrash [ $\theta$ ræ $\int$ ], vision ['vızn]
display math:

$$
\begin{array}{cc}
\Varangle(\vec{a}, \vec{b})=30^{\circ} \\
\prod_{x \leq 5} a_{x} \otimes b_{x} \simeq \int_{x \gtrsim 5} a \bigcirc b \mathrm{~d} x  \tag{nonsense.1}\\
\text { Gauss' law: } & \iiint_{V} \nabla \mathbf{F}(\mathbf{x}) \mathrm{d}^{3} x=\oiiint_{S(V)} \mathbf{F}(\mathbf{x}) \mathrm{d} \mathbf{a} \\
\text { Stokes' law: } & \iint_{A}[\nabla \times \mathbf{F}(\mathbf{x})] \mathrm{d} \mathbf{a}=\oint_{C(A)} \mathbf{F}(\mathbf{x}) \mathrm{d} \mathbf{l}
\end{array}
$$

APL Program:
$U \leftarrow{ }^{-} 1+G \leftarrow 2 \times \iota N \leftarrow \square \quad$ a generate vectors of odd and even numbers
APL keyboard layout:


## T 】

check the appropriate box like this $\boxtimes$ or that $\boxtimes$ :
$\square$ I need the wasy fonts
$\square$ I don't need the wasy fonts
wasy：

| 00 | $01=\triangleleft$ | $02=\unlhd$ | $03=\triangleright$ | $04=\unrhd$ | 05 | $06=0$ | $07=\boldsymbol{0}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 08 | $09=\Delta$ | $\mathrm{OA}=$＊ | $0 \mathrm{~B}=$ ¢ | OC | OD＝ | OE | 0F＝－ |
| 10 | 11 | $12=$ 方 | $13=\Omega$ | $14=$ V | $15=Q$ | $16=\otimes$ | $17=\Upsilon$ |
| 18 | $19=0$ | $1 \mathrm{~A}=\mathrm{O}^{7}$ | $1 \mathrm{~B}=0$ | $1 \mathrm{C}=\stackrel{\text { ® }}{ }$ | 1D | $1 \mathrm{E}=\Varangle$ | $1 \mathrm{~F}=\varnothing$ |
| 20 | $21=\circlearrowright$ | $22=0$ | $23=0$ | $24=\square$ | $25=D$ | $26=$＋ | $27=$ ¢ |
| 28 | 29 | 2A | 2B | $2 \mathrm{C}={ }^{(9}$ | $2 \mathrm{D}=\boldsymbol{\text { © }}$ | $2 \mathrm{E}=$ 安 | $2 \mathrm{~F}={ }^{\text {a }}$ |
| $30=\mho$ | $31=\bowtie$ | $32=\square$ | $33=\diamond$ | $34=\boxtimes$ | $35=\square$ | $36=$＋ | $37=0$ |
| $38=\bigcirc$ | $39=0$ | 3A | $3 \mathrm{~B}=\sim$ | $3 \mathrm{C}=\sqsubset$ | 3D $=\sqsupset$ | $3 \mathrm{E}=\lesssim$ | $3 \mathrm{~F}=\gtrsim$ |
| $40=$ \％ | $41=*$ | $42=*$ | $43=*$ | $44=\square$ | $45=\star$ | $46=\nabla$ | 47 |
| $48=$ | $49=0$ | $4 \mathrm{~A}=\mathrm{D}$ | 4B | $4 \mathrm{C}=\mathrm{V}$ | $4 \mathrm{D}=\S$ | $4 \mathrm{E}=€$ | $4 \mathrm{~F}=$ |
| $50=$ | 51 | $52=1$ | $53=$ \＆ | $54=\mathrm{f}$ | $55=$ ə | $56=$ ¢ | $57=0^{\circ}$ |
| $58=4$ | $59=$ ¢ | $5 \mathrm{~A}=$ ¢ | $5 \mathrm{~B}=$ \％ | $5 \mathrm{C}=\mathrm{P}$ | $5 \mathrm{D}=$ ¢ | $5 \mathrm{E}=$ II | $5 \mathrm{~F}=6$ |
| $60=m$ | $61=\Omega$ | $62=m$ ， | $63=\chi^{7}$ | $64=7$ | $65=\approx$ | $66=$－ | $67=$ ¢ |
| $68=\%$ | $69=\mathrm{b}$ | $6 \mathrm{~A}=\mathrm{P}$ | $6 \mathrm{~B}=$ ¢ | 6C | $6 \mathrm{D}=\mathbf{S}$ | $6 \mathrm{E}=$ 团 | $6 \mathrm{~F}=\square$ |
| $70=\boxminus$ | $71=\Theta$ | $72$ | $73=\iint$ | $74=\iiint$ | $75=\oint$ | $76=\oiiint$ |  |
| $78=\iint$ | $79=\iiint$ | $7 \mathrm{~A}=\oint$ | $7 B=\oiiint$ | $7 \mathrm{C}=$ | $7 \mathrm{D}=\square$ |  |  |

wasy 5 pt ：

wasyb：

| $00=\Delta$ | $01=\triangleleft$ | $02=\unlhd$ | $03=\triangleright$ | $04=\unrhd$ | $05=\therefore$ | $06=0$ | $07=$ Cr |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $08=\checkmark$ | $09=\Rightarrow$ | $0 \mathrm{~A}=\uparrow$ | OB＝小 | $0 \mathrm{C}=\mathrm{d}$ | OD $=$ d | OE＝ | OF＝－ |
| $10=4$ | $11=$ | $12=\zeta$ | $13=\Omega$ | $14=$ V | $15=Q$ | $16=\otimes$ | $17=\Upsilon$ |
| 18 | $19=$ | $1 \mathrm{~A}=0^{7}$ | $1 B=Q$ | $1 \mathrm{C}=$－${ }^{\text {c }}$ | $1 \mathrm{D}=\propto$ | 1E＝ | $1 F=\varnothing$ |
| 20 | $21=\circlearrowright$ | $22=0$ | $23=\bigcirc$ | $24=\square$ | $25=D$ | $26=$ 才 | $27=$ |
| $28=$ | 29 | 2A | $2 \mathrm{~B}=$ | $2 \mathrm{C}=$－ | $2 \mathrm{D}=$－ | $2 \mathrm{E}=$ 嫁 | $2 \mathrm{~F}={ }^{\text {P }}$ |
| $30=\mho$ | $31=\bowtie$ | $32=\square$ | $33=\diamond$ | $34=$－ | $35=\square$ | $36= \pm$ | $37=0$ |
| $38=\bigcirc$ | $39=0$ | $3 \mathrm{~A}=\sim$ | $3 \mathrm{~B}=\sim$ | $3 \mathrm{C}=\square$ | $3 \mathrm{D}=\sqsupset$ | $3 \mathrm{E}=\leq$ | $3 \mathrm{~F}=\geq$ |
| $40=$ \％ | $41=*$ | $42=*$ | $43=*$ | $44=0$ | $45=\star$ | $46=\nabla$ | $47=1$ |
| $48=$－ | $49=0$ | $4 \mathrm{~A}=\mathrm{D}$ | $4 \mathrm{~B}=\boldsymbol{\Delta}$ | $4 \mathrm{C}=\nabla$ | $4 \mathrm{D}=$ § | $4 \mathrm{E}=€$ | $4 \mathrm{~F}=3$ |
| $50=\gamma$ | $51=r$ | $52=1$ | $53=\mathscr{}$ | $54=$ ¢ | $55=9$ | $56=$ б | $57=0$ |
| $58=4$ | $59=$ ћ | $5 \mathrm{~A}=\hat{\text { ¢ }}$ | $5 \mathrm{~B}=\boldsymbol{\text { \％}}$ | $5 C=P$ | $5 \mathrm{D}=$ ¢ | $5 \mathrm{E}=$ II | $5 \mathrm{~F}=6$ |
| $60=\mathrm{mD}$ | $61=\Omega$ | $62=m$ | $63=\chi^{7}$ | $64=$ 万 | $65=\approx$ | $66=$－ | $67=$ ¢ |
| $68=\% 0$ | $69=\mathrm{b}$ | $6 \mathrm{~A}=\mathbf{P}$ | $6 \mathrm{~B}=$ 才 | $6 \mathrm{C}=0$ | $6 \mathrm{D}=\mathbf{3}$ | $6 \mathrm{E}=$ 田 | $6 \mathrm{~F}=$ ■ |
| $70=\boxminus$ | $71=\Theta$ | $72=\int$ | $73=\iint$ | $74=\iiint$ | $75=\oint$ | $76=$ | $77=$ |
| $78=\iint$ | $79=\iiint$ | $7 \mathrm{~A}=$ | $7 \mathrm{~B}=\oiiint$ |  | $7 \mathrm{D}=\square$ | $7 \mathrm{E}=$ | $7 \mathrm{~F}=9$ |

wasysl：

| $00=\Delta \quad 0$ | $01=\square$ | $02=\unlhd$ | 03 | $04=\unrhd$ | 05 | $06=\bigcirc$ | 07 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 0 | $09=$ ¢ | A | $\mathrm{OB}=\boldsymbol{\wedge}$ | $0 \mathrm{C}=$ d | OD＝d | E | F |
| $0=41$ | 11 | $12=3$ | $13=\Omega$ | $14=9$ | $15=Q$ | $16=\otimes$ | 17 |
|  | $19=$ | $1 \mathrm{~A}=$ | $1 B=Q$ | 1C | $1 \mathrm{D}=\propto$ | 1E | $1 F=\varnothing$ |
| 2 | $21=\circlearrowright$ | $22=\circlearrowleft$ | 23 | 24 | $25=D$ | 26 | $27=$ |
| $28=$＜ 29 | 29 | 2A | 2B | $2 \mathrm{C}=\bigcirc$ | $2 \mathrm{D}=\boldsymbol{*}$ | $2 \mathrm{E}=$ ¢ | $2 \mathrm{~F}=\mathrm{C}^{\circ}$ |
| $30=\mho \quad 31$ | $31=\bowtie$ | $32=\square$ | $33=$ | $34=$ | $35=\square$ | 36 | 37 |
| $38=039$ | $39=0$ | 3A | $3 \mathrm{~B}=\sim$ | $3 \mathrm{C}=\square$ | $3 \mathrm{D}=\sqsupset$ | $3 \mathrm{E}=\lesssim$ | $3 \mathrm{~F}=\gtrsim$ |
| $40=\approx 4$ | $41=*$ | $42=$ | $43=$ | 44 | 45 | $46=$ | 47 |
| $48=$－ 4 | 49 | $4 \mathrm{~A}=\mathrm{D}$ | $4 \mathrm{~B}=\boldsymbol{\Delta}$ | 4C | $4 \mathrm{D}=$ | $4 \mathrm{E}=€$ | $4 \mathrm{~F}=$ |
| $50=\gamma \quad 51$ |  | 52 | 53 | 54 | 5 | 6 | $7=0$ |
| $58=45$ | $59=$ | $5 \mathrm{~A}=$ ¢ | $5 \mathrm{~B}=\boldsymbol{\text { ¢ }}$ | $5 \mathrm{C}=$ | $5 \mathrm{D}=$ | $5 \mathrm{E}=$ | 5 F |
| $60=\mathrm{MD}$ | $61=\Omega$ | $62=m$ | $63=$ | 64 | $65=\approx$ | 66 | ， |
| $68=\%$ \％ | $69=p$ | $6 \mathrm{~A}=P$ | $6 \mathrm{~B}=$ | $6 \mathrm{C}=0$ | 6D $=\boldsymbol{K}$ | $6 \mathrm{E}=$ 円 | $6 \mathrm{~F}=$ 冋 |
| $70=母 \quad 7$ | $71=\Theta$ | $72=$ | $73=$ | $\iiint$ | $5$ | $76=$ |  |
| $B^{3}=\iint^{7}$ | $79=\iiint$ | $=$ | $B=\oiiint$ |  | $7 \mathrm{D}=\square$ | $7 \mathrm{E}=\square$ | $7 \mathrm{~F}=9$ |

## Changes since version 1.0

version 1.1:
\varangle has been centered at the math axis
version 2.0:
new: letters Р,p,ð,ə,っ,৫
new astrological and zodiacal symbols
new symbols permil, cent, ataribox
now the full set of lasy is included; for this purpose 9 characters $(\Theta), \boldsymbol{\Theta}, \odot, \not, \psi, \hbar, \hat{\jmath}$, $\Psi, \mathrm{E})$ have changed code!
wasyb10 font for bold math added
version 2.1:
new spacing for $\supset$
version 2.2:
wasysl10 font for slanted characters added
new German Paragraph §, currency €
new commands \wsl, \wbf
version 2.3:
new scaling for $\mathbf{S}$ (bugfix)
corrections for $\mathbb{T}$ and $\mathbb{1}$ at small fonts (bugfix)
italic corrections improved ( $\backslash /$ for wasysl10; works for symbols only without \hbox in the definition!)
new apple cmd symbol $\mathscr{H}$
version 2.4:
new characters long-s $f$ and round-z 3
improved $\circ^{\circ}$ (bugfix)
new macros for planets and some other astronomy symbols for use in math mode subscripts (i.e. proper size change).

