ZUSE KG · BAD HERSFELD

Elektronische Rechenanlagen

Befehlsliste und Erläuterungen zum Übersetzerprogramm

Z U S E Z 23

Reg.-Nr. 669

o NEo+6A26 Start Kurve

1' NEo+5A26 Start Gerade

2' NEo+453A26 Anfang Start

3' Eo+723A26 Kurve Stop

4' Eo+461A26 Sonder Kommando

5' CNSo+1

6' NUK24o+o $\Rightarrow$ G 0 $\Rightarrow$ G Kurve; -1 $\Rightarrow$ G Gerade

7' NAK5+o

8' UK251+o Rad.

9' NAK254+o x

1o' UK6+o

11' NAK252+o αx

12' Fo+425 $\frac{x}{\alpha x}$

13' CUAo+255 $128+\hat{x}$

14' CUSo+162 $162 - (128+\hat{x}) = 34+\hat{x}$

15' PPUK13+o

16' ZQQAKo+o

17' NAK6+o

18' PPPQQQRAKo+o $\frac{x}{\alpha x} \cdot 16 \Rightarrow \bar{\xi}$

19' UK623o+22o $\Rightarrow \bar{\xi}_v$

2o' NAK255+o y

21' UK6+o

22' NAK253+o αy

23' Fo+425 $\frac{y}{\alpha y}$

24' CUAo+255 $128+\hat{y}$

25' CUSo+162 $162 - (128+\hat{y}) = 34+\hat{y}$

26' PPUK13+o

27' ZQQAKo+o

28' NAK6+o

29' PPPQQQRAKo+o $\frac{y}{\alpha y} \cdot 16 \Rightarrow \bar{\eta}$

30' UKG22o+223 $\Rightarrow \eta_V$

31' CUAK23o+3 $V \rightarrow a$

32' PPQQEo+52A26 $V = o$?

33' CSo+1

34' PPQQEo+36A26 $V = 1$? Pktz. = 1 ?

35' Eo+54A26

36' NLLRAKV221+o $\bar{\xi}_1$

37' SK22o+o $-\bar{\xi}_o$

38' PPQQAKHo+o

39' UK246+o $\Rightarrow \xi$

4o' PPCNAK254+15 $15 \Rightarrow V\xi$

41' QQCNSK254+15 $-15 \Rightarrow V\xi$

42' QQNSK4+o

43' UK3+o $\Rightarrow |\xi|$

44' NAK224+o $\bar{\eta}_1$

45' SK223+o $-\bar{\eta}_o$

46' UK247+o $\Rightarrow \eta$

47' PPCNAK255+15 $15 \Rightarrow V\eta$

48' QQCNSK255+15 $-15 \Rightarrow V\xi$

49' QQNSK4+o $|\eta|$

5o' PPQQYKE251+o $\xi = \eta = o$? Rsprg.

51' QE24o+578A26 $G = -1$?

52' CAK23o+1 $V + 1 \Rightarrow V$

53' KE251+o Rsprg

54' NLLRAKV222+o $\bar{\xi}_2$ Kurve Prog.

55' SK221+o $-\bar{\xi}_1$

56' PPQQAKHo+o

57' UK254+o $\Rightarrow \xi_2 - \xi_1 \rightarrow 254$

58' NAK225+o $\bar{\eta}_2$

59' SK224+o $-\bar{\eta}_1$

60' UK255+0 $\Rightarrow \eta_2 - \eta_1 \rightarrow 255$

61' PPQQYKE251+0 $\bar{\xi}_2 - \bar{\xi}_1 = \bar{\eta}_2 - \bar{\eta}_1 = 0$?

62' CNAK238+0 $0 \Rightarrow \nu$

63' CNAK231+0 $0 \Rightarrow K_1\ K_2\ K_3$

64' NAK221+0 $\bar{\xi}_1$

65' SK220+0 $-\xi_0$

66' UK246+0 $\bar{\xi}_1\ -\bar{\xi}_0$

67' NAK254+0 $\xi_2\ -\xi_1$

68' PPQE246+75A26
69' PQQE246+75A26
} Sign ≠

70' NAK226+0 Vx

71' PPQQE0+74A26 Vx = 0 ?

72' PPQE246+75A26
73' PQQE246+75A26
} Sign Vx ≠ Sign $(\xi_1 - \xi_0)$ ≠ $(\bar{\xi}_2 - \bar{\xi}_1)$?

74' CAK231+1 $1 \Rightarrow K_1$

75' NAK224+0 $\bar{\eta}_1$

76' SK223+0 $-\bar{\eta}_0$

77' UK248+0 $\Rightarrow \bar{\eta}_1 - \bar{\eta}_0$

78' NAK255+0 $\bar{\eta}_2 - \bar{\eta}_1$

79' PPQE248+86A26
80' PQQE248+86A26
} Sign ≠

81' NAK227+0 V_y

82' PPQQE0+85A26 $V_y = 0$?

83' PPQE248+86A26
84' PQQE248+86A26
} Sign V_y ≠ Sign $(\bar{\eta}_1 - \bar{\eta}_0)$ ≠ $(\bar{\eta}_2 - \bar{\eta}_1)$?

85' CAK231+2 $1 \Rightarrow K_2$

86' NAK246+0 $\bar{\xi}_1 - \bar{\xi}_0$

87' QQNSK4+0 $|\bar{\xi}_1 - \bar{\xi}_0|$

88' UK6+0

89' NAK248+0 $\bar{\eta}_1 - \bar{\eta}_0$

90' QQMSK4+o $|\bar{\eta}_1 - \bar{\eta}_o|$

91' SK6+o

92' QQCAK231+4 $(\bar{\xi}_1 - \bar{\xi}_o) \quad > |\bar{\eta}_1 - \bar{\eta}_o|$? $< o \quad 1 \Rightarrow K_3$ $> o \quad o \Rightarrow K_3$

93' CUAK231+3

94' ZPPQQEo+3 $K_1 = K_2 = o$? Stop. Keine Monotonie

95' CSo+3

96' PPQQEo+1coA26 $K_1 = K_2 = 1$ Koordinaten in beiden Richtungen monoton ?

97' CUAK231+1

98' PPQQEo+1o3A26 $K_2 = 1 \quad K_1 = o$?

99' NEo+1o4A26 $K_2 = o \quad K_1 = 1$?

1oo' UK4+o 1 Bit des Akku = 1 ? $\langle a \rangle_1 = 1$?

1o1' QQNEo+1o4A26

1o2' CUAK231+4 $K_1 = 1 \quad K_2 = 1$?

1o3' CSo+4

1o4' UK238+o $K_3 = 1 \quad o \Rightarrow V$

1o5' AKo+o $K_3 = o \; -4 \Rightarrow V$

1o6' UK2+o $V \rightarrow 2$

1o7' NAK246+o $\bar{\xi}_1 - \bar{\xi}_o$

1o8' PUK244+o $\Rightarrow \xi_1$

1o9' QUK242+o $\Rightarrow \eta_1$

11o' NAK248+o $\eta_1 - \eta_o$

111' PUK242+o $\Rightarrow \eta_1$

112' QUK244+o $\Rightarrow \xi_1$

113' NAK222+o $\bar{\xi}_2$

114' SK22o+o $- \bar{\xi}_o$

115' PUK245+o $\Rightarrow \xi_2$

116' QUK243+o $\Rightarrow \eta_2$

117' NAK225+o

118' SK223+o $\bar{\eta}_2 - \bar{\eta}_o$

119' PUK243+o $\Rightarrow \eta_2$

12o' QUK245+o	$\Rightarrow \xi_2$
121' NAK243+o	η_2
122' SK242+o	$-\eta_1$
123' UK24o+o	$\rightarrow$ 240
124' NAK242+o	η_1
125' PQLLKEo+8182	(20 Bits)
126' UK6+o	
127' NAK244+o	ξ_1
128' Fo+424	$\frac{\eta_1}{\xi_1} = \Delta_1$
129' PQLLKEo+8189	26 Bits
13o' UK25o+o	$\rightarrow$ 250
131' NAK24o+o	$\eta_2 - \eta_1$
132' PQLLKEo+8182	(20 Bits)
133' UK6+o	
134' NAK245+o	
135' SK244+o	$\xi_2 - \xi_1$
136' Fo+424	
137' PQLLKEo+8189	$\frac{\eta_2-\eta_1}{\xi_2-\xi_1}$ 26 Bits
138' SK25o+o	$(\frac{\eta_2-\eta_1}{\xi_2-\xi_1} - \Delta_1)$
139' UK6+o	
14o' NAK245+o	: ξ_2
141' Fo+424	$\Rightarrow \Delta_2$ 26 Bits
142' UK247+o	$\Delta_2 \rightarrow$ 247
143' CMAo+1	ε = 1 Sign (ξ_1)
144' PE244+146A26	
145' CMSo+1	
146' SK244+o	$\varepsilon - \xi_1$
147' UK6+o	
148' NAK247+o	Δ_2
149' Fo+361	$(\varepsilon - \xi_1)\ \Delta_2$

150' AK25o+o $\Delta_1 + (\varepsilon - \xi_1)\,\Delta_2$

151' PE244+153A26

152' NSK4+o

153' UK239+o $\varepsilon\,\Delta_1 + (\varepsilon - \xi_1)\,\Delta_2 \Rightarrow \Delta^1\eta \quad \rightarrow 239$

154' NAK247+o Δ_2

155' LLPAKo+o $2\,\Delta_2$

156' NUK24o+o $\Rightarrow \Delta^2\eta$

157' NUK241+o $o \Rightarrow \Delta^3\eta \quad \rightarrow 241$

158' NAK247+o Δ_2

159' UK6+o

16o' NAK244+o ξ_1

161' Fo+361 $\xi_1\,\Delta_2$

162' NSK4+o $-\xi_1\,\Delta_2$

163' AK25o+o $\Delta_1 - \xi_1\,\Delta_2 \Rightarrow \eta'_o$ 26 Bits

164' CNAK13+2o

165' PPPQQQRAKo+o 6 Bits

166' NUK233+o $\Rightarrow \eta'_o \rightarrow 233$

167' QNE228+233A26 statt = - 1 ?

168' NAK238+o V

169' UK2+o

17o' PNAK227+o V_y (6 Bits)

171' QNAK226+o V_x (6 Bits)

172' PQLLKEo+8189 12 (Bits)

173' UK6+o

174' PNAK226+o V_x (6 Bits)

175' QNAK227+o V_y (6 Bits)

176' Fo+424 $V = o\ (\frac{Vy}{Vx})\ V = -1\ (\frac{Vx}{Vy})$

177' UK234+o $\Rightarrow \eta'_1 \rightarrow 234$ (6 Bits)

178' NAK233+o η'_o

179' Fo+361 $\eta'_o \cdot \eta'_1$ (12 Bits)

18o' CNAK13+6

181' PPPQQQRAKo+o 6 (Bits)

182' CAo+6M $1 \Leftarrow \eta'_o \quad \eta_A$

183' UK3+o

184' NAK234+o

185' SK233+o $\eta'_A - \eta'_o$ (6 Bits)

186' LLAKo+o

187' LLAKo+o $16\ (\eta'_A - \eta'_o)$ (10 Bits)

188' UK6+o

189' NAK3+o $(1 + \eta' \ \eta')$ 6 Bits

19o' Fo+424 $\frac{\eta'_A - \eta'}{1+\eta'\eta'_A} \Rightarrow tg\alpha \approx \alpha$ (4 Bits)

191' PPQQEo+231A26 $\alpha < \frac{1}{16}$?

192' NAK244+o ξ_1

193' UK6+o

194' NAK245+o ξ_2

195' Fo+361 $\xi_1 \cdot \xi_2$

196' UK255+o $\rightarrow$ 254

197' NAK234+o

198' SK233+o $\eta'_A - \eta'_o$ 6 Bits

199' PQLLKEo+8182 26 Bits

2oo' UK6+o

2o1' NAK255+o $\xi_1 \cdot \xi_2$

2o2' Fo+424 }
2o3' UK254+o } $\frac{\eta_A - \eta_o}{\xi_1 \cdot \xi_2} \Rightarrow \Delta_3 \rightarrow 254$

2o4' LLRAK4+o

2o5' LLRAKo+o $6\Delta_3$

2o6' PE244+2o8A26

2o7' NSK4+o $6\varepsilon\Delta_3$

2o8' UK241+o $\Rightarrow \Delta^3\eta \rightarrow 241$

2o9' NAK244+o ξ_1

210' AK245+0 $\xi_1 + \xi_2$

211' QE244+213A26

212' NSK4+0 $-\varepsilon(\xi_1 + \xi_2)$

213' CA0+1 $1 - \varepsilon(\xi_1 + \xi_2)$

214' AK255+0 $\left[1 - \varepsilon(\xi_1 + \xi_2) + \xi_1 \xi_2\right]$

215' PE244+217A26

216' NSK4+0 $\varepsilon\,[\cdot\cdot\cdot\cdot\cdot]$

217' UK6+0

218' NAK254+0 Δ_3

219' F0+361 $\varepsilon\,[\cdot\cdot\cdot\cdot\cdot]\quad \Delta_3$

220' AK239+0 $+\ \Delta^1\eta$

221' UK239+0 $\Rightarrow\ \Delta^1\eta$

222' CNA0+3

223' PE244+225A26

224' NSK4+0 3ε

225' SK244+0
226' SK245+0 } $3\varepsilon - (\xi_1 + \xi_2)$

227' LLRAK0+0 $\left[6\varepsilon - 2(\xi_1 + \xi_2)\right]$

228' UK6+0

229' NAK254+0 Δ_3

230' F0+361 $\Delta_3\quad [\cdot\cdot\cdot\cdot\cdot]$

231' AK240+0 $+\ \Delta^2\eta$

232' NUK240+0 $\Rightarrow \Delta^2\eta \rightarrow 240$

233' NUK228+0 $0 \Rightarrow$ start

234' NAK231+0 $K_1,\ K_2,\ K_3$

235' CS0+1

236' PPQQE0+244A26 $K_2 = K_3 = 0$?

237' CS0+5

238' PPQQE0+244A26 $K_3 = 1\quad K_1 = 0$?

239' CNAK231+15 $15 \Rightarrow \Delta\xi$

240' CNAK197+0 $o \Rightarrow b$

241' NAK244+0 ξ_1

242' NUK233+0 $\Rightarrow \xi_e$

243' NEo+249A26

244' CNAK231+8 $8 \Rightarrow \Delta\xi$

245' CNSK197+1 $-1 \Rightarrow b$

246' NAK245+0 ξ_2

247' NUK233+0 $\Rightarrow \xi_e$

248' CNAK22o+1 $1 \Rightarrow V$

249' NUK234+0 $o \Rightarrow \xi$

25o' UK235+o $o \Rightarrow \eta$

251' UK25o+o $o \Rightarrow \eta^x$

252' CNAo+15 15'

253' PQLLKEo+8179

254' UK248+o 15' (26 Bits) → 248

255' CNSK194+1 $-1 \Rightarrow P$

256' CNAK193+o $o \Rightarrow Z$

257' KE198+o

258' NAK25o+o η^x

259' SK239+o $\eta^x - \Delta^1\eta$

26o' UK25o+o $\Rightarrow \eta^x$

261' NAK2+o μ

262' AK231+o $+\Delta\xi \Rightarrow V\xi_i$

263' PPQQEo+312A26 $V\xi_i = o$

264' PE244+266A26 $V\xi_i$ Sign $(\xi_1) \Rightarrow V\xi_i$

265' NSK4+o

266' UK254+o $V\xi_i \rightarrow 254$

267' CNAK13+26

268' NAK25o+o η^x

269' PPPQQQAKo+o $[\eta^x]$

270' NUK255+0 $\Rightarrow V\eta_i$

271' CUAK13+14

272' PPPQQQAK0+0 $\eta^x - [\eta^x] \rightarrow 3$

273' NAK3+0

274' UK250+0 $\Rightarrow \eta^x$

275' NAK254+0 $V\xi_i$

276' AK234+0 $+\xi$

277' UK234+0 $\Rightarrow \xi$

278' NAK255+0 $V\eta_i$

279' AK235+0 $+\eta$

280' UK235+0 $\Rightarrow \eta$

281' QE194+205A26 $P = -1$?

282' NLLRAKV254+0 $V\xi_i$

283' SK192+0 $- V\xi_r$

284' PPQQAKN0+0

285' NAK255+0 $V\eta_i$

286' SK191+0 $- V\eta_r$

287' PPQQYE0+310A26 $V\xi_i - V\xi_r = V\eta_i - V\eta_r = 0$?

288' NAK255+0 η_i

289' UK6+0 Zwischenspeicher

290' NAK191+0 η_r

291' UK255+0 $\Rightarrow V\eta$

292' NAK6+0 $V\eta_i$

293' UK191+0 $\Rightarrow \eta_r$

294' NAK254+0 $V\xi_i$

295' UK6+0 Zwischenspeicher

296' NAK192+0 $V\xi_r$

297' UK254+0 $\Rightarrow V\xi$

298' NAK6+0 $V\xi_i$

299' UK192+0 $\Rightarrow V\xi_r$

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3co' NAK193+o      Z
3o1' UK2+o         Z ⇒ n
3o2' Fo+544A26     Fahrbefehl ( n, Vξ, Vη)
3o3' CNAK193+1     1 ⇒ Z
3o4' KE198+o
3o5' NAK254+o      Vξi
3o6' UK192+o       ⇒ Vξr
3o7' NAK255+o      Vηi
3o8' UK191+o       ⇒ Vηr
3o9' CNAK194+o     o ⇒ P
31o' CAK193+1      Z + 1 ⇒ Z
311' KE198+o
312' NLLRAKV239+o  Δ1η
313' PPAKNo+o      Δ1η ≥ o
314' CNSK255+15
315' YCNAK255+15   15 Sign Δ1η ⇒ Vηi
316' NSK255+o      - Vηi
317' PQLLKEo+8179  26 Bits
318' AK25o+o       + η x
319' NUK25o+o      η x - Vηi ⇒ η x
32o' UK254+o       o ⇒ Vξi
321' Eo+278A26
322'    15'
323'    15'
324'    15'
325'    31'
326'    31'
327'    29'
328'    27'
329'    25'
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330' 24'

331' 46'

332' 45'

333' 44'

334' 43'

335' 63'

336' 62'

337' 61'

338' 60'

339' 79'

340' 78'

341' 58'

342' 77'

343' 95'

344' 95'

345' 94'

346' 56'

347' 93'

348' 111'

349' 110'

350' 73'

351' 91'

352' 127'

353' 126'

354' 126'

355' 126'

356' 143'

357' 107'

358' 142'

359' 124'

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360'   159'
361'   141'
362'    88'
363'   158'
364'   175'
365'   175'
366'   157'
367'   122'
368'   174'
369'   191'
370'   156'
371'   173'
372'   190'
373'   207'
374'   155'
375'   172'
376'   189'
377'   206'
378'   120'
379'   137'
380'   171'
381'   205'
382'   239'
383'   239'
384'   239'
385'   255'
386'   255'
387' QE194+397A26        P = -1 ?
388' NAK193+0            Z
389' UK2+0               ⇒  n
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390' NAK192+0 ξ_r

391' UK254+0 $\Rightarrow V\xi$

392' NAK191+0 η_r

393' UK255+0 $\Rightarrow V\eta$

394' CNSK194+1 $-1 \Rightarrow P$

395' CNAK193+0 $0 \Rightarrow Z$

396' Fo+544A26 Fahrbefehl (n, $V\xi$, $V\eta$)

397' QE229+425A26 Stop -1 ?

398' NAK238+0 V

399' UK2+0

400' NAK220+0 $\bar{\xi}_0$

401' UK195+0 $\Rightarrow \bar{\xi}_r$

402' QAK235+0 $+\eta$

403' PAK234+0 $+\xi$

404' UK220+0 $\Rightarrow \bar{\xi}_0$

405' NAK223+0 $\bar{\eta}_0$

406' UK196+0 $\Rightarrow \bar{\eta}_r$

407' QAK234+0 $+\xi$

408' PAK235+0 $+\eta$

409' UK223+0 $\Rightarrow \bar{\eta}_0$

410' CNA0+64

411' PE244+413A26

412' NSK4+0 1 Sign ξ_1 (6 Bits)

413' PUK226+0 $\Rightarrow V_x$

414' QUK227+0 $\Rightarrow V_y$

415' CNAK13+?0

416' NAK239+0 $\Delta^1\eta$ (6 Bits)

417' PPPQQQRAK0+0

418' PUK227+0 $\Rightarrow V_y$

419' QUK226+0 $\Rightarrow V_x$

420' NAK222+0 $\bar{\xi}_2$

421' UK221+0 $\Rightarrow \bar{\xi}_1$

422' NAK225+0 $\bar{\eta}_2$

423' UK224+0 $\Rightarrow \eta_1$

424' KE251+0 Rsps.

425' NAK234+0 ξ

426' SK233+0 $-\xi_c$

427' PPQQE0+431A26

428' QQNSK4+0 $|\xi - \xi_c|$

429' UK231+0 $\Rightarrow \Delta\xi$

430' KE203+0

431' CNAK2+4 $4 \Rightarrow n$

432' CNAK254+0 $0 \Rightarrow V\xi$

433' CNAK255+0 $0 \Rightarrow V\xi$

434' F0+551A26 Wiederbefehl (4, 0, 0)

435' NAK238+0 V

436' UK2+0

437' NAK195+0 ξ_r

438' QAK235+0 $+\eta$

439' PAK234+0 $+\eta$

440' UK220+0 $\Rightarrow \xi_c$

441' NAK196+0 η_r

442' QAK234+0 $+\xi$

443' PAK235+0 $+\eta$

444' UK223+0 $\Rightarrow \eta_0$

445' CNAK220+1 $1 \Rightarrow V$ Funktionszähler

446' CNSK228+1 $-1 \Rightarrow$ Start

447' CNAK229+0 $0 \Rightarrow$ Stop

448' CNAK226+0 $0 \Rightarrow V_x$

449' CNAK227+0 $0 \Rightarrow V_y$

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450' KE251+o        Rspg.
451'  o             n°x
452'  o             n°y
-------------------------------------------------------------
453' NUK226+o       o ⇒ Vx              Anfangstart
454' NUK227+o       o ⇒ Vy
455' Uo+451A26       o ⇒ n°x
456' Uo+452A26       o ⇒ n°y
457' NUK23o+o        o ⇒ V
458' CNSK228+1       -1 ⇒ Start
459' NUK229+o        o ⇒ Stop
46o' CNSK19o+1       -1 ⇒ S
461' CNAK13+21
462' NAV198+811A26
463' KE5+o           Rspg.
-------------------------------------------------------------
464' UK6+o           Sonderkommando
465' NLLRAKV5+o
466' UK11+o          Rad → 11
467' CNAK254+o       o ⇒ Vξ
468' CNAK255+o       o ⇒ Vη
469' CNAK2+1         2 ⇒ n
47o' Fo+551A26       Fahrbefehl (2, o, o)
471' NLLRAGV6+484A26
472' FK4+8191
473' YEo+5o1A26      Stift Wechsel ?
474' UK6+o
475' CUSo+4          4- <a> → a
476' PPCNAK19o+o     <a>  ≥ o ⇒ S  (Stift(1,2,3,4) senken)
477' QQCNSK19o+1     <a> < o  -1 ⇒ S  (alle Stift heben)
478' NAK6+o
479' CNAK13+6
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48o' PPPQQQRAKo+o
481' NAK3+o
482' UK1+o
483' KE11+o
484' CNAHo+o
485' CNAHo+8
486' CNAHo+1o
487' CNAHo+2
488' CNAHo+5
489' CNAo+1
49o' CNAo+2
491' CNAo+3
492' CNAo+4
493' CNAo+6
494' CNAo+5
495' CNAo+11 oder CNAo+7
496' CNAo+8
497' CNAo+9
498' CNAo+1o
499' ZEo+15
5oo' ZEo+16
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	n_x	n_y	n	
	oo	oo	o	
	Lo	oo	1	Stifte
	Lo	Lo	2	Koordinaten
	oo	Lo	3	
	oL	oL	4	tichel Koordinaten
			5	Stift 1 senken
			6	" 2 "
			7	" 3 "
			8	" 4
			9	Punktstechen
			1o	elle Stifte heben
			11	Zwischen Stop
			12	Gravierstift links drehen
			13	" " rechts "
			14	Nullkreis drehen

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5o1' UK6+o      Stiftwechsel
5o2' CUAo+3
5o3' UK5+o      n¹y → 5
5o4' S5+452A26  n¹y - n°y ⇒ Δny → 5
5o5' Uo+452A26  n¹y ⇒ n°y
5o6' NAK6+o
5o7' RAKo+o
5o8' RAKo+o
5o9' UK6+o      ⇒ n¹x
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51o' S6+451A26	$n^1_x - n^o_x \Rightarrow \Delta n_x$
511' Uo+451A26	$n^1_x \Rightarrow n^o_x$
512' HLLRAKV5+o	Δn_y
513' PPQQAKHo+o	
514' HAK6+o	Δn_x
515' PPQQYKE11+o	$\Delta n_x = \Delta n_y = o$?
516' CHAK3+8	$8 \Rightarrow n$ (für $\frac{1}{16}$ Schritt) für $\frac{1}{32}$ CHAK3+16
517' HAK5+o	Δn_y
518' QQHSK4+o	$\lvert\Delta n_y\rvert$
519' CSo+2	
52o' PPQQEo+525A26	$\Delta n_y = 2$?
521' HAK6+o	Δn_x
522' QQHSK4+o	$\lvert\Delta n_x\rvert$
523' CSo+2	
524' QQHEo+526A26	$\Delta n_x < 2$?
525' CAK3+8	$n+8 \Rightarrow n$ (für $\frac{1}{16}$ Schritt) für $\frac{1}{32}$ CAK 3+16
526' HAK6+o	Δn_x
527' PPQQEo+53oA26	$\Delta n_x = o$?
528' PPCHAo+15	
529' QQCHSo+15	15 Sign $\Delta n_x \Rightarrow V\xi$
53o' UK254+o	$\Rightarrow \Delta y$
531' HAK5+o	Δn_y
532' PPQQEo+535A26	
533' PPCHAo+15	
534' QQCHSo+15	15 Sign $\Delta n_y \Rightarrow V\eta$
535' UK255+o	$\Rightarrow \Delta x$
536' HAK3+o	m
537' UK2+o	$\Rightarrow$ n
538' Fo+551A26	Fahrbefehl (n, Δx, Δy)
539' CHAK254+o	$o \Rightarrow \Delta x$

```
54o' CNAK255+o          o ⇒ Δy
541' CNAK2+8            8 ⇒ n
542' Fo+551A26          Fahrbefehl ( 8,o o)
543' KE11+o             Rspg.
-------------------------------------------------------------------
544' PE238+551A26       V = -1                  Unterprogramm für Fahrbefehl
                                                (n, Vξ , Vη stanzen)
545' NAK254+o           Vξ
546' UK6+o              Zwischenspeicher
547' NAK255+o           Vη
548' UK254+o           ⇒ Δx
549' NAK6+o             Vξ
55o' UK255+o           ⇒ Δy
551' NAK2+o             n
552' CSo+16             -16
553' PPCSK2+16          n≥16 ?    n-16 ⇒ n
554' QQCNAK2+o          n<16      o ⇒ n
555' PPCNAo+16          n≥16 ?
556' CUAo+31
557' CAo+32
558' PPPQQQRAKVo+o
559' NAK3+o
56o' UK1+o
561' NAK254+o           Δx
562' PPQQCNAo+16
563' CUAo+31
564' CAo+32
565' PPPQQQRAKVo+o
566' NAK3+o
567' UK1+o
568' NAK255+o           Δy
569' PPQQCNAo+16
```

```
570' CUAo+31
571' CAo+32
572' PPPQQQRAKVo+o
573' NAK3+o
574' UK1+o
575' NAK2+o
576' PPQQKE5+o          n = o ?
577' Eo+551A26
```

```
578' SK3+o              |η| - |ξ|          Gerade Prog.
579' PPQQEo+594A26
58o' QQNEo+594A26       |ξ| ≥ |η| ?
581' NAK246+o
582' UK6+o
583' NAK247+o
584' UK246+o
585' NAK6+o             ξ ⇒ η
586' UK247+o            η ⇒ ξ
587' NAK254+o           Vξ ⇒ Vη
588' UK6+o              Vη ⇒ Vη
589' NAK255+o
59o' UK254+o
591' NAK6+o
592' UK255+o
593' CUSo+1             -1 ⇒ V
594' UK238+o            o ⇒ V
595' NAK247+o           η
596' QE19o+742A26       S = -1   gehoben Stift ?     45° Fahren ?
597' PQLLKEo+8185       14 Bits
598' UK6+o
599' NAK246+o           ξ
```

600' Fo+424	$\frac{\eta}{\xi}$
601' UK232+0	$\Rightarrow$ tg . φ (14 Bits)
602' CHAK13+7	
603' HAK6+0	φ
604' QQHSK4+0	Tg . $\lvert\varphi\rvert$
605' PPPQQQRAKo+0	}
606' CAo+1	} Aufrundung 6 Bits
607' RAKo+0	}
608' HAG4+322A26	$F([\varphi]_{\frac{1}{64}}) \Rightarrow V\xi$
609' CUAo+15	
610' PE246+612A26	
611' HSK4+0	$V\xi$ Sign $\xi_1 \Rightarrow V\xi$
612' UK24o+0	$V\xi \Rightarrow 240$
613' UK6+0	
614' HAK232+0	tg φ
615' Fo+361	$V\xi$. tgφ
616' CHAK13+14	
617' CHAK3+0	
618' PPPQQQRAKo+0	$\Rightarrow V\eta$ $r \Rightarrow 3$
619' HUK241+0	$V\eta \Rightarrow 241$
620' HRAKV246+0	$\frac{r}{2} \Rightarrow r \Rightarrow 3$
621' UK6+0	
622' HAK3+0	
623' HUK232+0	$r \Rightarrow 232$
624' HUK248+0	$o \Rightarrow \xi^x$
625' HUK25o+0	$o \Rightarrow \eta^x$
626' HAK24o+0	$V\xi$
627' Fo+424	$\frac{\xi}{V\xi} \Rightarrow N$
628' PPQQEo+682A26	N = o ?
629' HUK243+0	N $\Rightarrow$ 243

630' NUK242+0	$0 \Rightarrow n'$
631' NUK244+0	$0 \Rightarrow rs$
632' NUK2+0	$0 \Rightarrow \mu$
633' NUK245+0	$0 \Rightarrow$ üb (o $\Rightarrow$ Sign)
634' CUASK232+4096	
635' PPQQE0+7041A26	r = o ?
636' NAK244+0	r_s
637' AK232+0	+r
638' UK244+0	$\Rightarrow r$
639' PE245+645A26	üb = o ? Sign = o ?
640' PE244+659A26	$r_s < 1$?
641' NAK244+0	r_s
642' AK1+0	-1
643' UK244+0	r_s -1 $\Rightarrow r_s$
644' E0+646A26	
645' QE244+668A26	$r_s \geq 1$?
646' CAK2+1	μ + 1 $\Rightarrow \mu$
647' NAK248+0	ξ^x
648' AK240+0	$+V\xi$
649' UK248+0	ξ^x
650' NAK250+0	η^x
651' AK241+0	$+ V\eta$
652' SK245+0	+ üb. (+Sign) -(-1) = +1
653' UK250+0	$\Rightarrow \eta^x$
654' CAK242+1	n' + 1 $\Rightarrow$ n'
655' NAK242+0	n'
656' SK243+0	-N
657' QQE0+636A26	n' < N ?
658' E0+676A26	
659' NAK240+0	$V\xi$

660' UK254+o $\Rightarrow$ 254

661' NAK241+o $V\eta$

662' CAo+1 +1

663' UK255+o $\Rightarrow V\eta$

664' Fo+544A26 Fahrbefehl (n, $V\xi$, $V\eta$ + 1) *

665' CNAK245+o o $\Rightarrow$ Sign oder (üb.)

666' CNAK2+o o $\Rightarrow\mu$

667' Eo+646A26

668' NAK240+o $V\xi$

669' UK254+o $\Rightarrow$ 254

670' NAK241+o $V\eta$

671' UK255+o $\Rightarrow$ 255

672' Fo+544A26 Fahrbefehl (n, $V\xi$, $V\eta$) *

673' CNSK245+1 -1' $\Rightarrow$ üb. (Sign)

674' CNAK2+o o $\Rightarrow\mu$

675' Eo+641A26

676' NAK240+o $V\xi$

677' UK254+o $\Rightarrow$ 254

678' NAK241+o $V\eta$

679' SK245+o + üb.(+Sign) -(-1) = 1

680' UK255+o $\Rightarrow V\eta$

681' Fo+544A26 Fahrbefehl (n, $V\xi$, $V\eta$) *

682' NLLRAKV246+o ξ

683' SK248+o $-\xi^x$

684' UK254+o $\Rightarrow V\xi$

685' PPQQAKHo+o

686' NAK247+o η

687' SK250+o $-\eta^x$

688' UK255+o $\Rightarrow V\eta$

689' PPQQYEo+695A26 $\xi - \xi^x = \eta - \eta^x = o$?

* <2> $\Rightarrow \mu \Rightarrow$ n

690' CNAK2+1 $1 \Rightarrow \mu \Rightarrow n$

691' QQNSK4+o

692' CSo+16 $\eta - \eta^x \geq 16$

693' PPEo+647A26

694' Fo+544A26 Fahrbefehl (1, $V\xi$, $V\eta$)

695' CNAK2+4 $4 \Rightarrow n$

696' CNAK254+o $o \Rightarrow V\xi$

697' CNAK255+o $o \Rightarrow V\xi$

698' Fo+551A26 Fahrbefehl (4, o, o)

699' NAK221+o $\bar{\xi}_1$

7oo' UK22o+o $\Rightarrow \bar{\xi}_o$

7o1' NAK224+o $\bar{\eta}_1$

7o2' UK223+o $\Rightarrow \eta_o$

7o3' KE251+o Rspg.

7o4' NAK24o+o $V\xi$

7o5' UK6+o

7o6' NAK243+o N

7o7' Fo+361 $V\xi$. N

7o8' UK248+o $\Rightarrow \xi^x$

7o9' NAK241+o $V\eta$

71o' UK6+o

711' NAK243+o N

712' Fo+361 N . $V\eta$

713' UK25o+o $\Rightarrow \eta^x$

714' NAK24o+o $V\xi$

715' UK254+o -> 254

716' NAK241+o $V\eta$

717' UK255+o -> 255

718' NAK243+o N

719' UK2+o $\Rightarrow$ n

```
720' UK242+o          ⇒ n'
721' Fo+544A26        Fahrbefehl (n, Vξ, Vη)
722' Eo+682A26
-------------------------------------------------------------------
723' NAK5+o           Kurve Stop
724' UK251+o
725' CUAK230+3
726' PPQQKE251+o      V = o ?  Rspg.
727' CSo+1            V = 1
728' PPPQQE197+736A26   b = o  V = 1 ?  Gerade Prog.
729' PPQQEo+446A26  b=-1 V = 1 ? Rspg.
730' CNSK229+1         -1 ⇒ Stop     V = 2
731' CNAK193+o         o ⇒ Z
732' CNSK194+1         - 1 ⇒ P
733' NAK245+o          ξ2
734' UK233+o           ⇒ ξe
735' KE198+o
736' CNSK240+1         -1 ⇒ G
737' CNSK228+1         -1 ⇒ Start
738' CNAK229+o         o ⇒ Stop
739' CNAK226+o         o ⇒ Vx
740' CNAK227+o         o ⇒ Vy
741' Eo+36A26
-------------------------------------------------------------------
742' UK6+o            η ⇒ 6          mit gehobenem Stift
743' QQNSK4+o         |η|            45° Fahren
744' CSo+15
745' PPQQEo+771A26     η = 15 ?
746' PPEo+755A26       η > 15 ?
747' NAK247+o          η
748' UK255+o           ⇒ Vη
749' PPPE246+751A26    |η| Sign. ξ ⇒ Vξ
```

```
750' NSK4+o
751' UK254+o        ⇒ Vξ
752' CNAK2+1        1 ⇒ n
753' Fo+544A26      Fahrbefehl (1, Vξ, Vη)
754' Eo+773A26
755' NAK255+o       Vη
756' Fo+424         η
                    V̄η̄
757' UK6+o          ⇒ n      r (rest) → 2
758' NAK2+o         r
759' UK232+o        → 232
76o' NAK6+o         N

761' UK2+o          ⇒ n
762' Fo+544A26      Fahrbefehl (n, Vξ, Vη )
763' NAK232+o       r
764' PPQQEo+773A26  r = o ?
765' UK254+o        → 254
766' PE?47+769A26
767' NSK4+o
768' UK255+o        r Sign η ⇒ Vη
769' NAK246+o       ξ
77o' QQCUSK254+o    r Sign ξ ⇒ Vξ
771' CNAK2+1        1 ⇒ n
772' Fo+544A26      Fahrbefehl (1, Vξ, Vη )
773' NAK246+o       ξ
774' UK2+o          → 2 !!
775' QQNSK4+o       |ξ|
776' UK3+o
777' NAK247+o       η
778' QQNSK4+o       |η|
779' USK3+o         |ξ| - |η| ⇒|ξ|
```

```
780' PPQQEo+695A26      ξ = o        P1 ⇒ Po  Rsps.
781' CNAK255+o          o ⇒ Vη
782' QUSK4+o            |ξ| Sign ξ ⇒ ξ
783' UK6+o
784' PPCNAK254+15
785' QQCNSK254+15       15 Sign ξ ⇒ Vξ
786' QQNSK4+o           |ξ|
787' CSo+15
788' PPQQEo+807A26      |ξ| = 15
789' PPEo+794A26        |ξ| >15
790' NAK6+o             ξ
791' UK254+o            ⇒ Vξ
792' CNAK2+1            1 ⇒ n
793' Fo+544A26          Fahrbefehl (1, Vξ, Vη )
794' NAK254+o           Vξ
795' Fo+424             :
796' UK6+o              ⇒ n      r (Rest) → 2
797' NAK2+o             r
798' UK232+o            → 232
799' NAK6+o             N
800' UK2+o              ⇒ n
801' Fo+544A26          Fahrbefehl (n, Vξ, Vη )
802' NAK232+o           r
803' PPQQEo+695A26      r = o
804' PE246+806A26
805' NSK4+o             r  Sign ξ ⇒ Vξ
806' UK254+o            → 254
807' CNAK2+1            1 ⇒ N
808' CNAK255+o          o ⇒ Vη
809' Fo+544A26          Fahrbefehl (1, Vξ, o)
```

```
810' Eo+695A26          P1 ⇒ Po      Rspg.
811' NAK234+o           ξ
812' SK233+o              - ξe
813' QQNSK4+o           |ξ - ξe|
814' SK231+o            - Δ ξ
815' QQEo+387A26        |ξ - ξe| < Δ ξ
816' NSK231+o           - Δ ξ
817' UK2+o              ⇒ μ
818' NAK25o+o           η^x
819' AK239+o            + Δ^1 η
82o' UK25o+o            ⇒ η^x
821' QQNSK4+o
822' SK248+o            |η^x| - 15
823' PPEo+258A26        |η^x| ≥ 15
824' CAK2+1             μ + 1 ⇒ μ
825' NAK239+o           Δ^1 η
826' AK24o+o            + Δ^2 η
827' UK239+o            ⇒ Δ^1 η
828' NAK24o+o           Δ^2 η
829' AK241+o            + Δ^3 η
83o' UK24o+o            ⇒ Δ^2 η
831' QKE2o5+o             μ<o ?
832' Eo+261A26
```