

AZpost

User Guide

to

Horizontal Turning Centers

HTC2X (XZ)

prepared by

NCDData Services & Associates
Manufacturing Solutions
www.NCDDataServices.com

NCDData@frontiernet.net
928-532-8045

10-JAN-2013

**Postprocessor vocabulary and syntax is based on and complies with the
ANSI X3.37-199X Standard (June 30, 1992) for APT programming Language.
Working draft published as X3J7/55-323-06-92**

UPDATE	DATE	AUTHOR	REASON

A0000	10-JAN-2013	LJones	Initial delivery

Table of Contents

Table of Contents	4
AUTOPS Syntax	5
AUXFUN syntax.	6
CIRCLE & CYLNDR syntax.	7
COOLNT syntax.....	9
CUTTER syntax.....	10
DEBUG Syntax.....	11
DISPLY syntax.	12
DELAY syntax.....	13
DELAY syntax.....	13
END syntax.	14
FEDRAT syntax.....	15
FINI syntax.	16
FROM syntax.....	17
GODLTA syntax.....	18
GOHOME syntax.....	19
GOTO syntax.....	20
INDIRV syntax.	21
INSERT syntax.	22
INTOL Syntax.	23
LIMITS Syntax.....	24
TAPER Syntax.....	25
TURRET syntax.....	26
MACHIN syntax.....	28
MODE syntax.	29
OPSKIP syntax.	30
OPSTOP syntax.	31
ORIGIN syntax.	32
OUTTOL Syntax.	33
PARTNO syntax.	34
PPLIST syntax.	36
PREFUN syntax.....	37
RAPID syntax.	38
RESTAR syntax.....	39
REWIND syntax.	40
SEQNO syntax.....	41
SET Syntax	42
SPINDL syntax.	43
STOP syntax.	44
TPRINT syntax.	45
TRANS syntax.....	46
Example APT source Part Program file.....	47
Example machine code output file (NCD).....	53

AUTOPS Syntax

APT syntax used as part of and prior to circular interpolation syntax to specify that the part surface is automatically defined at the current tool position.

Effect of the configuration file on the AUTOPS output:

None

Effect of the AUTOPS syntax on the configuration file:

None

APT Syntax:

AUTOPS

APT example

AUTOPS

Example machine code

===> No output

AUXFUN syntax.

APT syntax used to output an auxiliary machine function using the M0 register. This code is usually output with an "M" letter and a two digit integer code, but depends on the word address and format specification of the predefined M0 register.

Effect of the configuration file on the AUXFUN output:

Word address and format of M0 register

Effect of the AUXFUN syntax on the configuration file:

None

APT Syntax:

AUXFUN / m

APT example

AUXFUN / 5

Example machine code

==> M05

CIRCLE & CYLNDR syntax.

Defines the circular interpolation information for output to the machine code file.

Effect of the configuration file on CIRCULAR output:

```
SET/CIRCLE syntax in section 1
Word address and format of G1,I,J,K,R registers
Values for CLW & CCLW set with G1 register
```

Effect of CIRCULAR syntaxes on the configuration file:

None

APT Syntax:

```
MOVARC/ CENTER, x-center, y-center, z-center, $
        AXIS, i-value, j-value, k-value, $
        RADIUS, radius
GOTO/ x-endpnt, y-endpnt, z-endpnt
```

---- or ----

```
TLON,GOFWD/ (CIRCLE/ x-center,y-center,z-center,radius),$
            ON, (LINE/ x-center,y-center,z-center,      $
                x-endpnt,y-endpnt,z-endpnt)
```

---- or ----

```
TLON,GOFWD/ (CIRCLE/ x-center,y-center,z-center,radius),$
            ON, 2,INTOF, (LINE/ x-center,y-center,z-center,      $
                x-endpnt,y-endpnt,z-endpnt)
```

---- or ----

```
TLON, GOFWD/ (CYLNDR/ x-center, y-center, z-center,$
                i-value, j-value, k-value, radius),$
ON,2,INTOF, (PLANE/ (POINT/ x-center,y-center,z-center),$
                (POINT/ x-endpnt, y-endpnt, z-endpnt), $
                (POINT/ x-center, y-center, z-center))
```

---- or ----

```
TLON, GOFWD/ (CYLNDR/ x-center, y-center, z-center,$
                i-value, j-value, k-value, radius),TANTO,$
            (PLANE / (POINT/ x-endpnt, y-endpnt, z-endpnt),$
            ,PERPTO, (VECTOR/ i-value, j-value, k-value))
```

where: x-center, y-center, z-center = arc center point coordinates

x-endpnt, y-endpnt, z-endpnt = arc end point coordinates

x-value, y-value, z-value = direction vector values

Example:

INDIRV/ .00000, 1.00000, .00000

TLON,GOFWD/ (CIRCLE/ 16.00000, 11.00000, .00000, 4.00000),\$
ON,(LINE/ 16.00000, 11.00000, .00000,\$
16.00000, 15.00000, .00000)

Example machine code

G03 X16. Y15. I-4. J0.

COOLNT syntax.

APT syntax used to specify for output the desired coolant feature to the machine code file. If syntax is specified after TURRET and before GOTO syntax the output will be held for output by the RESTAR macro.

Effect of the configuration file on COOLNT output:

Word address and format of M2 register
Values for minor words set with M2 register

Effect of the COOLNT syntax on the configuration file:

Sets value of COOLNT variable for use in Macro section

APT Syntax		Example machine code
-----		-----
COOLNT / ON	==>	M08
FLOOD	==>	M08
MIST	==>	M07
THRU	==>	M20
TAP	==>	M21
AIR	==>	M22
OFF	==>	M09

CUTTER syntax.

APT syntax used to specify the desired cutting tool dimensions.

Effect of the configuration file on CUTTER output:

None.

Effect of the CUTTER syntax on the configuration file:

None.

Turning syntax

CUTTER / dia

where: dia = Twice the Nose Point Radius (NPR).

APT example:

CUTTER /.031

Example machine code

==> No output

DEBUG Syntax

Postprocessor syntax used to display internal information during postprocessing.

Effect of the configuration file on the DEBUG output:

None

Effect of the DEBUG syntax on the configuration file:

None

APT Syntax:

DEBUG/ SEC4, n

Where: n = An integer number specifying the level of displayed
information

DISPLY syntax.

APT syntax used to specify comments in the output listing file and the machine code file.

Effect of the configuration file on DISPLY output:

None.

Effect of DISPLY syntax on the configuration file:

None.

APT Syntax

DISPLY character text

Where: character_text = alpha-numeric character string will be
included in machine code file.

APT Example

DISPLY THIS IS A MESSAGE ==> (THIS IS A MESSAGE)

Example machine code

(THIS IS A MESSAGE)

DELAY syntax.

APT syntax used to specify the desired program dwell to the machine code file.

Effect of the configuration file on DELAY output:

Word address and format of PP register

Effect of DELAY syntax on the configuration file:

None

APT Syntax

DELAY / REV, r
 s

where: s = Dwell in (SEConds or REVolutions)

APT Example:

DELAY / 2, SEC

==>

Example machine code

G04 P2.0

END syntax.

APT syntax used to specify the end of the program. Mostly used for continuous loop to the program start type of programs.

Effect of the configuration file on END output:

Word address and format of M5 register.
Values set with M5 register in configuration file.
Contents of the PRGEND macro.

Effect of END syntax on the configuration file:

None

Syntax

END

APT Example

END

==>

Example machine code

M09
G0 G53 H0 Z0.
X0. Y0.
M2

FEDRAT syntax.

APT syntax used to specify the desired feed rate to the machine code file.
If syntax is specified after LOAD and before GOTO syntax the output will
be held for output by RESTAR macro.

Effect of the configuration file on FEDRAT output:

Word address and format of FF register

Effect of FEDRAT syntax on the configuration file:

Sets value of FEED variable for use in Macro section

Syntax:

FEDRAT / (UPM), f
UPR
IPM
IPR
MMPM
MMPR

where: f = feed rate value in the specified units

APT Example:

FEDRAT / 8, IPM
GOTO / 5.0, 6.0, 0.0

Example machine code

==>
==> G01 X5. Y6. Z0. F8.

FINI syntax.

APT syntax used to specify the end of the program input. This syntax causes the postprocessor to produce reports in specific output files and close all input and output files.

Effect of the configuration file on FINI output:

SET/ FOOTER in section one of configuration file.

Effect of FINI syntax on the configuration file:

None

APT Syntax

FINI

FROM syntax.

APT syntax used to specify the initial machine position at program start. The values of X,Y & Z axis specified set the postprocessor HOME positions. This syntax must be specified prior to first TURRET and GOTO syntax. This syntax output the initial machine code block.

Effect of the configuration file on FROM output:

Contents of the FROM Macro in section three.

Effect of FROM syntax on the configuration file:

None.

APT Syntax:

FROM / x, y, z

APT Example

FROM / 0, 0, 0

Example machine code

==> G90 G20 G80 G40

GODLTA syntax.

APT syntax used to specify an incremental machine position relative to the previous motion. The values of X,Y & Z axis specified are the incremental values. The I J & K values are the vector components of the unit tool axis.

Effect of the configuration file on GODLTA output:

None.

Effect of the FROM syntax on the configuration file:

None.

APT Syntax:

GODLTA / x, y, z [,i ,j ,k]

APT Example

Example machine code

GOTO / 1.0, 2.0, 3.0, 0.0, 0.0, 1.0

GODLTA / 0.0, 0.0, .50, 0.0, 0.0, 1.0 ==> X1.0 Y2.0, Z3.5

GOHOME syntax.

APT syntax used to specify machine motion to the machine home position.

Effect of the configuration file on GOHOME output:

Contents of GOHOME macro in section three of configuration file.

Effect of the GOHOME syntax on the configuration file:

None

APT Syntax:

GOHOME/ XAXIS, x, ZAXIS, z

Example:

GOHOME/ XAXIS, -.1, ZAXIS, .2 ==>

Example machine code

G01X0.Z24.5F120

GOTO syntax.

APT syntax used to specify the desired linear machine motion. The first GOTO syntax after TURRET syntax causes the RESTAR macro activation.

Effect of the configuration file on GOTO output:

Word address and format of G1, XX, YY, & ZZ registers.
First GOTO after TURRET syntax activates RESTAR macro.
SET/SPINDL,AXIS,Z

Effect of the GOTO syntax on the configuration file:

None.

Syntax:

GOTO / x, y, z

where: x, y, z = coordinate position

APT Example:

GOTO / 1, 2, 3

==>

Example machine code

G01 X1. Y2. Z3.

IMPORTANT NOTE: When in a turning operation the Y-axis value should be zero (0.0000) unless the SET/SPINDL,AXIS,X syntax is used. In this case the Z-axis value should be zero (0.0000). See SET/SPINDL,AXIS syntax.

SET/SPINDL,AXIS,X is the default for this postprocessor.

INDIRV syntax.

APT syntax used before a CIRCLE or CYLNDR syntax to indicate the direction of travel on the circle by using unit vector components as a direction vector from the current position.

Effect of the configuration file on INDIRV output:

None.

Effect of the INDIRV syntax on the configuration file:

None.

APT Syntax:

INDIRV/ X-Component, Y-Component, Z-Component

Example:

INDIRV / 1, 0, 0 direction in plus X-axis

INSERT syntax.

APT syntax used to specify a literal output machine block. This syntax is not checked for correctness or completeness. This syntax is mostly used to output blocks of special characters. Use of '/' immediately following INSERT causes sequence numbers to be added immediately before character text.

Effect of the configuration file on INSERT output:

None.

Effect of the INSERT syntax on configuration file usage:

None.

APT Syntax:

INSERTcharacter text

or

INSERT/character text

APT Example:

INSERTG80G49

===>

Example machine code

G80G49

INSERT/G80G49

===>

N12G80G49

INTOL Syntax.

This APT syntax specifies the tolerance used when creating linear tool path points inside the part drive surface CIRCLE or CYLNDR.

Effect of the configuration file on INTOL output:

None.

Effect of the INTOL syntax on configuration file usage:

None.

```
APT Syntax
-----
INTOL /  value
```

Where: value = The distance from the circle allowed.

LIMITS Syntax.

APT syntax used to specify the axis limits for the machining envelope of the part to be machined.

Effect of the configuration file on LIMITS output:

None.

Effect of LIMITS syntax on configuration file useage:

Limits (XAXIS & ZAXIS) can be specified in the program using the LIMITS syntax overriding limit values in the configuration file and MACHIN syntax.

Syntax: (Sets machining envelope)

LIMITS/ [XAXIS, min, max][,ZAXIS, min, max]
OFF
ON

Syntax: (Adjusts zero location)

LIMITS/ ADJUST, XAXIS, x, ZAXIS, z

Example:

LIMITS/ XAXIS,0,12, ZAXIS,0,36 \$\$ Set machining envelope 12 X 36
LIMITS/ ADJUST, XAXIS, 1, ZAXIS, 5 \$\$ Set zero

(HTC2X)

TAPER Syntax.

APT syntax used to specify the application of taper U0.0 on the next nth following GOTO motion in the machining sequence.

Effect of the configuration file on TAPER output:

None.

Effect of TAPER syntax on configuration file useage:

None.

Syntax:

TAPER/ NEXT [,n]

Where:

n = number of the next GOTO motion to apply taper.

Example:

TAPER/ NEXT, 4

G01 X2.0 Z6.0 F0.012
Z4.125
G2 X2.25 Z4.0 R.125
X3.0

Applied AT 4TH GOTO ➔ Z2.0 U0.0 F0.008

TURRET syntax.

APT syntax used to specify the desired Turret index to the machine code file. If syntax is used in conjunction with the CUTTER syntax to completely define the tool.

Effect of the configuration file on TURRET output:

- Use of SET/TOOL,MAX,value in section one
- Use of SET/TOOL,LIST,ON in section one
- Word address and format of TT register
- Contents of RETRCT, TLCHG, TLCHG1 & RESTAR macros

Effect of TURRET syntax on configuration file usage:

Sets value of CURTL, GAGEZ variables for use in Macro section

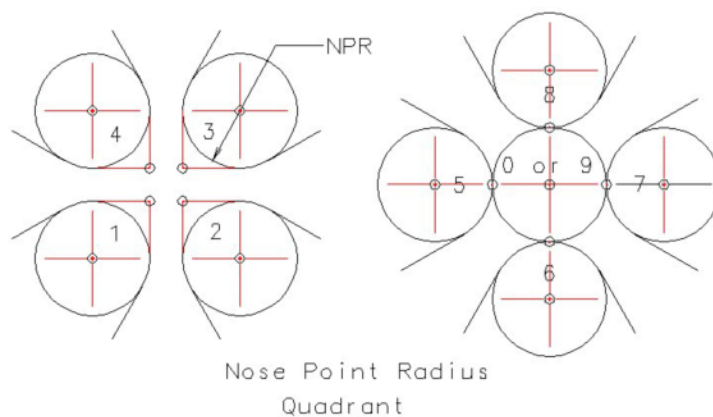
Syntax:

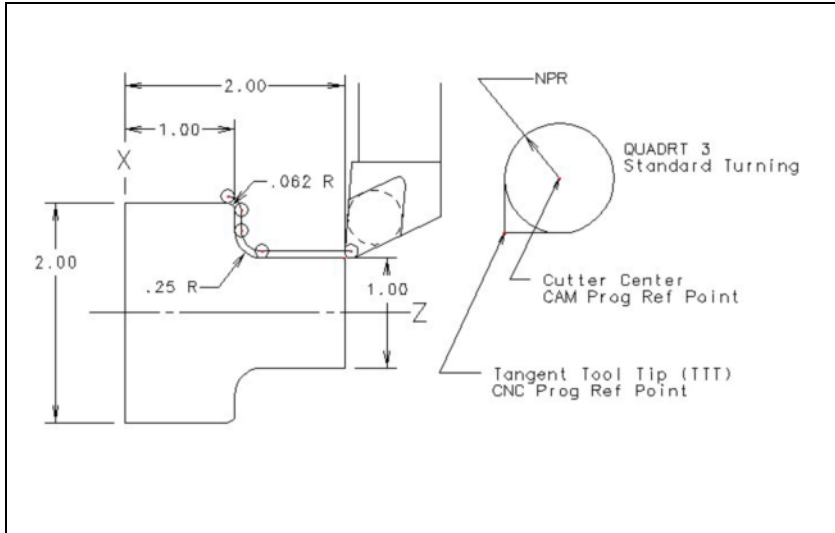
TURRET/ FACE, t [, GAGE, x,z], QUAD, q [, ADJUST, h]

TURRET/ t, h [,CCLW]
CLW

where:

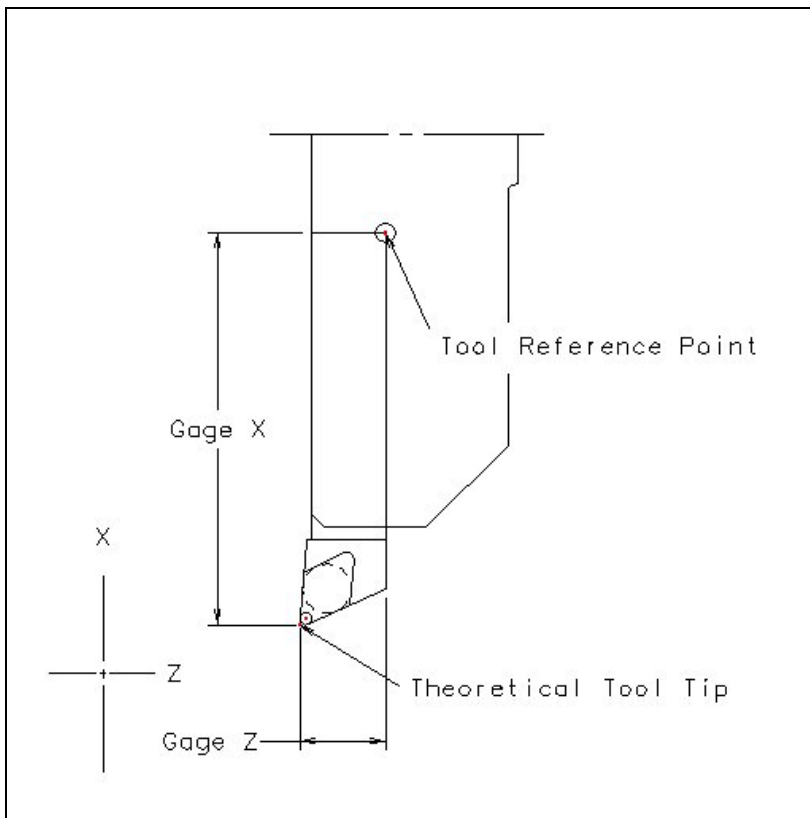
- t = Turret face number
- x = Set length of tool in x-axis
- z = Set length of tool in Z-axis
- q = Tool tip to center of nose point radius quadrant (see figure 1)
- h = Length compensation register (defaults same as turret face number)





Example quad 3 turning:

TURRET/ FACE,1, QUAD,3



Turning tool gage lengths (if required to be applied to CLdata)

Example:

TURRET/ FACE, 1, GAGE, -4.0, -1.25, QUAD,3

MACHIN syntax.

APT syntax used to specify the desired postprocessor, configuration file, UNITS, and Axis limits. The MACHIN syntax should be programmed in the beginning of the program.

Effect of the configuration file on MACHIN output:

None.

Effect of the MACHIN syntax on configuration file useage:

Specifies the name of the configuration file (.cfg) for the required machine tool. If configuration file name is not specified or file is not found the postprocessor will prompt the user for the configuration file name.

Input and output UNITS can be specified in the program using the MACHIN syntax overriding UNITS in the configuration file.

Syntax:

```
-----  
MACHIN/ ACRA12 [,UNITS,INCHES,OUT,MM]  
                MM          INCHES
```

ACRA12 - specifies the machine tool configuration (example)

Example:

```
-----  
MACHIN / ACRA12
```

MODE syntax.

APT syntax used to specify the desired machining mode to the machine code file.

Effect of the the configuration file on MODE output:

None.

Effect of the MODE syntax on configuration file use:

None.

Syntax:

```
-----  
MODE/  INCHES  
      MM  
      XYPLAN  
      YZPLAN  
      ZXPLAN
```

APT Example:

```
-----  
MODE / INCH    ===>  
MODE / MM      ===>
```

Example machine code

```
-----  
G70  
G71
```

OPSKIP syntax.

APT syntax used to specify a block delete code to the machine code file.

Effect of the configuration file on OPSKIP output:

None.

Effect of the OPSKIP syntax on configuration file use:

None.

AP Syntax:

OPSKIP [/ ON]
 OFF

APT Example:

OPSKIP ===>
GOTO/ 1,2,3 ===>

Example machine code

No output
/N1234 G01 X1. Y2. Z3.

OPSTOP syntax.

APT syntax used to specify an optional stop code to the machine code file.

Effect of the configuration file on OPSTOP output:

Word address and format of M5 register.
Values specified with M5 register.

Effect of the OPSTOP syntax on configuration file use:

None.

APT Syntax:

OPSTOP

APT Example:

OPSTOP ==>

Example machine code

M01

ORIGIN syntax.

APT syntax used to specify the desired coordinate system origin. If syntax is specified after TURRET and before GOTO syntax the output will be held for output by RESTAR macro.

Effect of the configuration file on ORIGIN output:

Word address and format of G10 register.
Values defined for G10 register.

Effect of the ORIGIN syntax on configuration file use:

Sets value of FIXTUR variable for use in Macro section

Syntax:

ORIGIN / FIXTUR, m [, x, z]
ORIGIN / DATUM, x, z
ORIGIN / x, z

where: m = work coordinate system select (FIXTUR)

0 = 1st value (G53)
1 = 2nd value (G54)
2 = 3rd value (G55)
3 = 4th value (G56)
4 = 5th value (G57)
5 = 6th value (G58)
6 = 7th value (G59)

ORIGIN/ DATUM x & z = values output with 7th value of G10 (G92)

ORIGIN/ x & z = values are subtracted from following GOTO x, y, z
(translation)

APT Example

ORIGIN / FIXTUR, 2
ORIGIN / DATUM, 1, 2
ORIGIN / 10, 2
GOTO/ 1, 2, 3
ORIGIN / TURRET, 2, XAXIS, 4.250, ZAXIS, 11.545

Example machine code

==> G55
==> G92 X1, Y2. Z3.
==> No output
==> G00 X-9. Y-3. Z1.
==> G10P10002X4.25Z11545

OUTTOL Syntax.

This APT syntax specifies the tolerance used when creating linear tool path points outside the part drive surface CIRCLE or CYLNDR.

Effect of the configuration file on OUTTOL output:

None.

Effect of the OUTTOL syntax on configuration file use:

None.

```
APT Syntax
-----
OUTTOL / value
```

Where: value = Distance from the circle allowed.

Example:

```
OUTTOL/ .010
```

PARTNO syntax.

APT syntax used to specify the desired Program ID and part information to the machine code file. The PARTNO syntax should be programmed in the beginning of the part program.

Effect of the configuration file on PARTNO output:

Contents of START macro in configuration file

Effect of the PARTNO syntax on configuration file use:

Sets value of PROGID variable for use in Macro section.
Sets value of PARTNO variable for use in Macro section.

APT Syntax

PARTNO numeric_id character_text

Where: numeric_id = numeric value specifying Program ID (PROGID).
character_text = text string specifying the Part
Information (PARTNO).

APT Example

PARTNO 1234 OPERATION A

====>

Example machine code

%
:1234
(-1234.NC)

PPRINT syntax.

APT syntax used to specify comments in the output listing file and conditionally to the machine code file. If the PPRINT syntax is specified before the first CUTTER syntax and SET/PPRINT,LIST,ON is used in the configuration file the output will be displayed in the machine code file as comments.

Effect of the configuration file on PPRINT output:

SET/PPRINT,LIST,ON in section one of the configuration file

Effect of the PPRINT syntax on configuration file use:

None.

APT Syntax

PPRINT character text
PPRINT(character text)

Where: character_text = alpha-numeric character string and
(character_text) = character text enclosed in () will also be
included in machine code file.

APT Example

PPRINT(THIS IS A MESSAGE) ==> (THIS IS A MESSAGE)

Example machine code

(THIS IS A MESSAGE)

PPLIST syntax.

APT syntax used to specify the format of the output for the NC listing (.NCL) file.

Effect of the configuration file on PPLIST output:

None.

Effect of the PPLIST syntax on configuration file use:

None.

APT Syntax

PPLIST/	OFF	- Turns off output to listing file.
	MIXED	- MIXED APT and Machine Code in listing.
	FORMAT	- Classic column formatted listing.

PREFUN syntax.

Output an preparatory machine function using the G0 register. This code is usually output with a "G" letter and a two digit integer code, but depends on the word address and format specification of the predefined G0 register.

Effect of the configuration file on PREFUN output:

Word address and format of G0 register

Effect of the PREFUN syntax on configuration file use:

None

APT Syntax

PREFUN / g

where: g = G-code

APT example

PREFUN / 98

==>

Example machine code

G98

RAPID syntax.

APT syntax used to specify a rapid motion to the next cutter path point (GOTO syntax). This syntax is not modal and must be specified for each GOTO syntax

Effect of the configuration file on RAPID output:

Defines the G1 register code used for RAPID motion G1(0).
SET/ RAPID, 150 sets rapid to G01 and 150 IPM

Effect of the RAPID syntax on configuration file use:

None.

APT Syntax

RAPID

APT example

RAPID

GOTO/ 1.0, 2.0, 3.0

SET/RAPID,150

RAPID

GOTO/ 1.0, 2.0, 3.0

Example machine code

GO X1. Z3.

G01 X1. Z3. F150.

RESTAR syntax.

APT syntax used to cause a restart at the next GOTO motion.

Effect of the configuration file on RESTAR output:

Contents of RESTAR Macro.

Effect of the RESTAR syntax on configuration file use:

None.

APT Syntax

RESTAR

APT example

RESTAR

GOTO/ 2.0, 0.0, 5.0

Example machine code

No immediate output

G0 T0100

G97 S485 M3

G0 X4.0 Z5.0 M9

G50 S20000

G96 S500

REWIND syntax.

APT syntax used at the end of the program (before FINI) to output a program (tape) rewind code (M30 typically).

Effect of the configuration file on REWIND output:

Contents of PRGEND Macro
Uses the value of M2 register code M2(30).

Effect of the REWIND syntax on configuration file use:

None.

APT Syntax

REWIND

APT example

REWIND

Example machine code

G53Z-1.F150

M30

SEQNO syntax.

APT syntax used to specify the sequence numbers (N) assigned to the machine code records (blocks).

Effect of the configuration file on SEQNO output:

Uses the value of NN register.

Effect of the SEQNO syntax on configuration file use:

None.

APT Syntax

SEQNO/ n, INCR, I	Specifies sequence start and increment values.
ON	Turns sequence numbering off.
OFF	Turns sequence numbering on.

Where:

n = Start number
I = Increment number

APT example

SEQNO/ 10, INCR, 5

Example machine code

N10...
N15...
N20...

SET Syntax

APT syntax used to specify mode of operation of postprocessor input, output or CNC functions.

Effect of the configuration file on SET output:

Configuration file syntax is same effect as aptsource syntax

Effect of the SET syntax on configuration file use:

Over-rides the configuration syntax of same function/feature.

APT Syntax

**SET/ SPINDL, AXIS, X
Z**

Used to establish relationship between aptsource coordinate system and machine tool coordinate system. SET/ SPINDLE, AXIS defines the aptsource spindle axis as X or Z. Z-axis is the default.

SPINDL syntax.

APT syntax used to specify spindle speed for output to the machine code file. If syntax is specified after TURRET and before GOTO syntax the output will be held for output by RESTAR macro. The SPINDL syntax is used for both the TURNING spindle and the TURRET tool spindle (see CUTTER syntax)

Effect of the configuration file on SPINDL output:

Word address and format of SS & M3 register
Values for minor words set with M3 register

Effect of the SPINDL syntax on configuration file use:

Sets value of RPM variable for use in Macro section

APT Syntax

SPINDL / (RPM) , s (,CLW) [,RANGE, LOW]
 SFM CCLW HIGH
 MAXRPM, s

SPINDL / s (,RPM) (,CLW)
 CCLW

SPINDL / RANGE, LOW
 HIGH

where: s = Spindle speed in RPM or SFM

APT example

SPINDL / RPM, 600, CLW ==>

Example machine code

S600 M03

STOP syntax.

APT syntax used to specify a program machine stop to the machine code file. The first motion after STOP will be output by RESTAR macro.

Effect of the configuration file on STOP output:

Word address and format of M5 register.
Values for minor words set with M5 register.
The first motion after STOP will be output by RESTAR macro.

Effect of the STOP syntax on configuration file use:

None.

APT syntax

STOP

APT example

STOP

==>

Example machine code

M00

TPRINT syntax.

APT syntax used to specify tool comments in the output listing file and to the machine code file. The TPRINT syntax must be used prior to each LOAD /TOOL syntax. The postprocessor will collect all the TPRINTs in the part program and output them as comments at the beginning of the machine code file if SET/TOOL,LIST,ON is specified in section one of the configuration file.

Effect of the configuration file on PPRINT output:

SET/TOOL,LIST,ON in section one of the configuration file

Effect of the PPRINT syntax on configuration file use:

None.

APT Syntax

TPRINT character text

Where: character_text = alpha-numeric character string and

APT Example

TPRINT 1/2-13 TAP 6.500 LGH ==> (1/2-13 TAP 6.500 LGH)
LOAD/TOOL,4,LENGTH,6.5

Example machine code

TRANS syntax.

APT syntax used to specify a desired translation on the part coordinate system.

Effect of the configuration file on TRANS output:

None.

Effect of the TRANS syntax on configuration file use:

None.

APT syntax

TRANS / x, y, z

where: x, y, z = values are added to all following motions

APT example:

TRANS / .5, .5, 0

GOTO / 1, 2, 3

Example machine code

==> No output

==> G00 X1.5 Y2.5 Z3.

Example APT source Part Program file.

```
MACHIN/ SC28FA, 0
PARTNO _____-____ SEQ ____
PPRINT( 450 SFM )
FROM / 43.50000, .00000, .00000
SEQNO / 10, INCR, 10
CUTTER/ .124
SPINDL/ 91.88896, RPM, CLW
DELAY / 2
FEDRAT/ .018, IPR
TURRET/ 6, 6
TRANS / 15.188, 6.316
PPRINT( INDEX TO FACE )
RAPID
GOTO / 3.93700, -7.86300, .00000
COOLNT/ ON
RAPID
GOTO / 3.16200, -7.86300, .00000
FEDRAT/ .018, IPR
GOTO / 3.16200, -10.74300, .00000
PPRINT( RGH FACE )
RAPID
GOTO / 3.26200, -10.74300, .00000
RAPID
GOTO / 3.26200, -7.86300, .00000
RAPID
GOTO / 2.93700, -7.86300, .00000
FEDRAT/ 10, IPM
GOTO / 2.93700, -7.98800, .00000
PPRINT( FEED TO POS )
FEDRAT/ .018, IPR
GOTO / 2.93700, -8.16232, .00000
PPRINT( RGH CHF )
RAPID
GOTO / 2.98700, -8.11232, .00000
RAPID
GOTO / 2.98700, -7.86300, .00000
RAPID
GOTO / 2.76268, -7.86300, .00000
FEDRAT/ 10, IPM
GOTO / 2.76268, -7.98800, .00000
PPRINT( FEED TO POS )
FEDRAT/ .018, IPR
GOTO / 2.93700, -8.16232, .00000
PPRINT( CHF I.D. )
GOTO / 2.93700, -10.74300, .00000
PPRINT( FACE )
COOLNT/ OFF
RAPID
GOTO / 3.93700, -10.74300, .00000
GOHOME/ XAXIS, -2.5, ZAXIS, 24.5
SPINDL/ 83.90076, RPM, CLW
DELAY / 2
CUTTER/ .124
```

```

FEDRAT/ .018, IPR
TURRET/ 1, 1
PPRINT( INDEX TO TURN )
TRANS / 13.218, 4.187
RAPID
GOTO / 3.93700, -10.64300, .00000
COOLNT/ ON
RAPID
GOTO / 3.13700, -10.64300, .00000
RAPID
GOTO / 3.13700, -10.41800, .00000
FEDRAT/ .018, IPR
GOTO / -.11200, -10.41800, .00000
PPRINT( RGH TURN )
RAPID
GOTO / .08800, -10.61800, .00000
RAPID
GOTO / 3.13700, -10.61800, .00000
RAPID
GOTO / 3.13700, -10.19300, .00000
RAPID
GOTO / 3.13700, -10.19300, .00000
FEDRAT/ 10, IPM
GOTO / 3.01200, -10.19300, .00000
PPRINT( FEED TO POS )
FEDRAT/ .018, IPR
GOTO / 2.83768, -10.19300, .00000
PPRINT( RGH CHF )
RAPID
GOTO / 2.88768, -10.24300, .00000
RAPID
GOTO / 3.13700, -10.24300, .00000
RAPID
GOTO / 3.13700, -10.01868, .00000
FEDRAT/ 10, IPM
GOTO / 3.01200, -10.01868, .00000
PPRINT( FEED TO POS )
FEDRAT/ .018, IPR
GOTO / 2.83768, -10.19300, .00000
PPRINT( CHF O.D. )
GOTO / 2.18200, -10.19300, .00000
PPRINT( TURN LANDS )
GOTO / 1.18200, -10.30550, .00000
GOTO / -.08800, -10.30550, .00000
TURRET/ 0, 8
PPRINT( ADD OFFSET )
GOTO / -.08800, -10.18123, .00000
PPRINT( BRK BOTTOM )
TURRET/ 0, 8
TURRET/ 0, 8
TURRET/ 0, 8
DELAY / 2, REV
RAPID
GOTO / -.08800, -10.50550, .00000
COOLNT/ OFF
RAPID
GOTO / 3.78700, -10.50550, .00000

```



```

GOHOME/ XAXIS, -2.5, ZAXIS, 24.5
SPINDL/ 83.90076, RPM, CLW
DELAY / 2
CUTTER/ 0
FEDRAT/ .006, IPR
TURRET/ 2, 2
TRANS / 13.547, 2.875
PPRINT( INDEX TO GROOVE )
RAPID
GOTO /      3.07500,  -10.29350,      .00000
COOLNT/ ON
RAPID
GOTO /      .20400,  -10.29350,      .00000
TURRET/ 0, 2
TURRET/ 0, 2
TURRET/ 0, 2
FEDRAT/ .006, IPR
GOTO /      .20400,  -9.96350,      .00000
PPRINT( GROOVE )
DELAY / 2, REV
FEDRAT/ 50, IPM
GOTO /      .20400,  -10.29350,      .00000
GOTO /      .13500,  -10.29350,      .00000
FEDRAT/ .006, IPR
GOTO /      .20400,  -10.22450,      .00000
PPRINT( BRK BOTTOM EDGE )
FEDRAT/ 50, IPM
GOTO /      .20400,  -10.29350,      .00000
GOTO /      .27300,  -10.29350,      .00000
FEDRAT/ .006, IPR
GOTO /      .20400,  -10.22450,      .00000
PPRINT( BRK TOP EDGE )
GOTO /      .20400,  -10.19950,      .00000
PPRINT( DEBURR )
FEDRAT/ 50, IPM
GOTO /      .20400,  -10.34350,      .00000
COOLNT/ OFF
RAPID
GOTO /      4.87500,  -10.34350,      .00000
GOHOME/ XAXIS, -2.5, ZAXIS, 24.5
SPINDL/ 84.83244, RPM, CLW
DELAY / 2
FEDRAT/ .023, IPR
TURRET/ 3, 3
TRANS / 12.75, 2.968
CUTTER/ .226
PPRINT( INDEX TO RGH PATH )
RAPID
GOTO /      3.78800,  -10.29400,      .00000
COOLNT/ ON
RAPID
GOTO /      2.27393,  -10.29400,      .00000
PPRINT( POS      .601)
TURRET/ 0, 3
TURRET/ 0, 3
TURRET/ 0, 3
FEDRAT/ .01534, IPR

```

```

GOTO / 2.13526, -10.15533, .00000
FEDRAT/ .023, IPR
GOTO / 1.14042, -10.15533, .00000
PPRINT( RGH PATH )
GOTO / 1.14042, -10.18533, .00000
FEDRAT/ .01534, IPR
RAPID
GOTO / 2.13697, -10.18533, .00000
FEDRAT/ .01534, IPR
GOTO / 2.16526, -10.18533, .00000
GOTO / 1.92909, -9.94916, .00000
FEDRAT/ .023, IPR
GOTO / 1.25945, -9.94916, .00000
PPRINT( RGH PATH )
GOTO / 1.25945, -9.97916, .00000
FEDRAT/ .01534, IPR
RAPID
GOTO / 1.93080, -9.97916, .00000
FEDRAT/ .01534, IPR
GOTO / 1.95909, -9.97916, .00000
GOTO / 1.71792, -9.73799, .00000
FEDRAT/ .023, IPR
GOTO / 1.46627, -9.73799, .00000
PPRINT( RGH PATH )
GOTO / 1.46627, -9.76799, .00000
RAPID
GOTO / 1.46627, -10.40650, .00000
COOLNT/ OFF
RAPID
GOTO / 4.96800, -10.40650, .00000
GOHOME/ XAXIS, -2.5, ZAXIS, 24.5
SPINDL/ 83.90076, RPM, CLW
DELAY / 2
CUTTER/ .5
FEDRAT/ .018, IPR
TURRET/ 5, 5
TRANS / 12.5, 3.125
PPRINT( INDEX TO CONTOUR PATH )
RAPID
GOTO / 3.42500, -10.48100, .00000
COOLNT/ ON
FEDRAT/ 2, IPM
RAPID
GOTO / 2.30304, -10.48100, .00000
PPRINT( POS .322)
TURRET/ 0, 5
TURRET/ 0, 5
TURRET/ 0, 5
FEDRAT/ 2, IPM
GOTO / 2.30304, -10.38100, .00000
FEDRAT/ .02, IPR
AUTOPS
INDIRV/ -1.00000, .00000, .00000
TLON, GOFWD/ (CIRCLE/ 2.30304, -10.05300, .00000, $
.32800), ON, (LINE/ 2.30304, -10.05300, .00000, $
1.98773, -10.14333, .00000)
PPRINT( TOP HALF )

```

```

FEDRAT/ .016, IPR
AUTOPS
INDIRV/      -.29791,      .95459,      .00000
TLON,GOFWD/      (CIRCLE/      1.59166,      -10.25678,      .00000,$
      .41200),ON,(LINE/      1.59166,      -10.25678,      .00000,$
      1.62000,      -9.84576,      .00000)

RAPID
GOTO /      1.62000,      -10.59350,      .00000
RAPID
GOTO /      .91400,      -10.59350,      .00000
FEDRAT/ 2, IPM
GOTO /      .91400,      -10.49350,      .00000
FEDRAT/ .02, IPR
AUTOPS
INDIRV/      1.00000,      .00000,      .00000
TLON,GOFWD/      (CIRCLE/      .91400,      -10.16550,      .00000,$
      .32800),ON,(LINE/      .91400,      -10.16550,      .00000,$
      1.23949,      -10.20596,      .00000)

PPRINT( BOTTOM HALF )
FEDRAT/ .016, IPR
AUTOPS
INDIRV/      .14774,      .98903,      .00000
TLON,GOFWD/      (CIRCLE/      1.64834,      -10.25678,      .00000,$
      .41200),ON,(LINE/      1.64834,      -10.25678,      .00000,$
      1.62000,      -9.84576,      .00000)

RAPID
GOTO /      1.62000,      -10.48100,      .00000
SPINDL/ 102.54537, RPM, CLW
DELAY / 2
RAPID
RAPID
GOTO /      2.30304,      -10.48100,      .00000
FEDRAT/ 2, IPM
GOTO /      2.30304,      -10.38100,      .00000
FEDRAT/ .022, IPR
AUTOPS
INDIRV/      -1.00000,      .00000,      .00000
TLON,GOFWD/      (CIRCLE/      2.30304,      -10.05300,      .00000,$
      .32800),ON,(LINE/      2.30304,      -10.05300,      .00000,$
      1.98773,      -10.14333,      .00000)

PPRINT( TOP HALF )
AUTOPS
INDIRV/      -.29844,      .95443,      .00000
TLON,GOFWD/      (CIRCLE/      1.59166,      -10.25678,      .00000,$
      .41200),ON,(LINE/      1.59166,      -10.25678,      .00000,$
      1.72472,      -9.86686,      .00000)

RAPID
GOTO /      1.72472,      -10.59350,      .00000
RAPID
GOTO /      .91400,      -10.59350,      .00000
FEDRAT/ 2, IPM
GOTO /      .91400,      -10.49350,      .00000
FEDRAT/ .022, IPR
AUTOPS
INDIRV/      1.00000,      .00000,      .00000
TLON,GOFWD/      (CIRCLE/      .91400,      -10.16550,      .00000,$
      .32800),ON,(LINE/      .91400,      -10.16550,      .00000,$

```

```

1.23949,      -10.20596,      .00000)
PPRINT( BOTTOM HALF )
FEDRAT/ .022, IPR
AUTOPS
INDIRV/      .14644,      .98922,      .00000
TLON,GOFWD/      (CIRCLE/      1.64834,      -10.25678,      .00000,$
      .41200),ON,(LINE/      1.64834,      -10.25678,      .00000,$
      1.51528,      -9.86686,      .00000)

AUTOPS
INDIRV/      .95319,      .30238,      .00000
TLON,GOFWD/      (CIRCLE/      1.64834,      -10.25678,      .00000,$
      .41200),ON,(LINE/      1.64834,      -10.25678,      .00000,$
      1.62000,      -9.84576,      .00000)

FEDRAT/ .006, IPR
GOTO /      1.62000,      -9.77800,      .00000
PPRINT( PLUNGE RELIEF )
DELAY / 2, REV
GOTO /      1.62000,      -9.78300,      .00000
RAPID
GOTO /      1.62000,      -10.58100,      .00000
COOLNT/ OFF
RAPID
GOTO /      10.50000,      -10.58100,      .00000
END
FINI

```

Example machine code output file (NCD).

```
[ _____ - ____ SEQ _____ ]

N0010G90
N0020G94F10.M44
N0030G92X0.Z43.5
[ 450 SFM ]
N0040G97S92M03
N0020G04P2.
N0030T606
[ INDEX TO FACE ]
N0040S92M03
N0050G04P2.
N0060G01X-1.547Z19.125F120.
N0070Z18.35F120.M08
N0080X-4.427F1.65
[ RGH FACE ]
N0090Z18.45F120.
N0100X-1.547
N0110Z18.125
N0120X-1.672F10.
[ FEED TO POS ]
N0130X-1.8463F1.65
[ RGH CHF ]
N0140X-1.7963Z18.175F120.
N0150X-1.547
N0160Z17.9507
N0170X-1.672F10.
[ FEED TO POS ]
N0180X-1.8463Z18.125F1.65
[ CHF I.D. ]
N0190X-4.427
[ FACE ]
N0200Z19.125F120.M09
N0210G01X-2.5Z24.5F120.
N0220S84
N0230G04P2.
N0240T101
[ INDEX TO TURN ]
N0250S84M03
N0260G04P2.
N0270G01X-6.456Z17.155F120.
N0280Z16.355F120.M08
N0290X-6.231
N0300Z13.106F1.51
[ RGH TURN ]
N0310X-6.431Z13.306F120.
N0320Z16.355
N0330X-6.006
N0340Z16.23F10.
[ FEED TO POS ]
N0350Z16.0557F1.51
[ RGH CHF ]
```

N0360X-6.056Z16.1057F120.
 N0370Z16.355
 N0380X-5.8317
 N0390Z16.23F10.
 [FEED TO POS]
 N0400X-6.006Z16.0557F1.51
 [CHF O.D.]
 N0410Z15.4
 [TURN LANDS]
 N0420X-6.1185Z14.4
 N0430Z13.13
 N0440T008
 [ADD OFFSET]
 N0450X-5.9942
 [BRK BOTTOM]
 N0460T008
 N0470T008
 N0480T008
 N0490G04P1.43
 N0500G01X-6.3185F120.
 N0510Z17.005M09
 N0520G01X-2.5Z24.5F120.
 N0530G04P2.
 N0540T202
 [INDEX TO GROOVE]
 N0550S84M03
 N0560G04P2.
 N0570G01X-7.4185Z16.622F120.
 N0580Z13.751F120.M08
 N0590T002
 N0600T002
 N0610T002
 N0620X-7.0885F.5
 [GROOVE]
 N0630G04P1.43
 N0640G01X-7.4185F50.
 N0650Z13.682
 N0660X-7.3495Z13.751F.5
 [BRK BOTTOM EDGE]
 N0670X-7.4185F50.
 N0680Z13.82
 N0690X-7.3495Z13.751F.5
 [BRK TOP EDGE]
 N0700X-7.3245
 [DEBURR]
 N0710X-7.4685F50.
 N0720Z18.422F120.M09
 N0730G01X-2.5Z24.5F120.
 N0740S85
 N0750G04P2.
 N0760T303
 [INDEX TO RGH PATH]
 N0770S85M03
 N0780G04P2.
 N0790G01X-7.326Z16.538F120.
 N0800Z15.0239F120.M08
 [POS .601]

N0810T003
 N0820T003
 N0830T003
 N0840X-7.1873Z14.8853F1.3
 N0850Z13.8904F1.95
 [RGH PATH]
 N0860X-7.2173
 N0870Z14.887F120.
 N0880Z14.9153F1.3
 N0890X-6.9812Z14.6791
 N0900Z14.0094F1.95
 [RGH PATH]
 N0910X-7.0112
 N0920Z14.6808F120.
 N0930Z14.7091F1.3
 N0940X-6.77Z14.4679
 N0950Z14.2163F1.95
 [RGH PATH]
 N0960X-6.8
 N0970X-7.4385F120.
 N0980Z17.718M09
 N0990G01X-2.5Z24.5F120.
 N1000S84
 N1010G04P2.
 N1020T505
 [INDEX TO CONTOUR PATH]
 N1030S84M03
 N1040G04P2.
 N1050G01X-7.356Z15.925F120.
 N1060Z14.803F120.M08
 [POS .322]
 N1070T005
 N1080T005
 N1090T005
 N1100X-7.256F2.
 N1110G02X-7.0183Z14.4877I.328K0.F1.68
 [TOP HALF]
 N1120G03X-6.7208Z14.12I-.1134K-.3961F1.34
 N1130G01X-7.4685F120.
 N1140Z13.414
 N1150X-7.3685F2.
 N1160G03X-7.081Z13.7395I.328K0.F1.68
 [BOTTOM HALF]
 N1170G02X-6.7208Z14.12I-.0508K.4088F1.34
 N1180G01X-7.356F120.
 N1190S103
 N1200G04P2.
 N1210G01Z14.803
 N1220X-7.256F2.
 N1230G02X-7.0183Z14.4877I.328K0.F2.26
 [TOP HALF]
 N1240G03X-6.7419Z14.2247I-.1134K-.3961
 N1250G01X-7.4685F120.
 N1260Z13.414
 N1270X-7.3685F2.
 N1280G03X-7.081Z13.7395I.328K0.F2.26
 [BOTTOM HALF]

N1290G02X-6.7419Z14.0153I-.0508K.4088
N1300G02X-6.7208Z14.12I-.3899K.1331
N1310G01X-6.653F.62
[PLUNGE RELIEF]
N1320G04P1.17
N1330G01X-6.658
N1340X-7.456F120.
N1350Z23.M09
N1360G01X0.Z43.5T000
N1370M30
%