Algol 60 grammar (tncy)

```
<empty>
::=
```

1. Basic Symbols

```
<basic symbol>
::=     <letter>
|       <digit>
|       <logical value>
|       <delimiter>
```

1.1. Letters

```
<letter>
::=     a
|       b
|       c
|       d
|       e
|       f
|       g
|       h
|       i
|       j
|       k
|       l
|       m
|       n
|       o
|       p
|       q
|       r
|       s
|       t
|       u
|       v
|       w
|       x
|       y
|       z
|       A
|       B
|       C
|       D
|       E
|       F
|       G
|       H
|       I
|       J
|       K
|       L
|       M
|       N
|       O
|       P
|       Q
|       R
|       S
|       T
|       U
|       V
|       W
|       X
|       Y
|       Z
```

1.1.1. Digits

```
<digit>
::=     0
|       1
|       2
|       3
|       4
|       5
|       6
|       7
|       8
|       9
```

1.1.2. Logical values

```
<logical value>
::=     true
|       false
```

1.2. Delimiters

```
<delimiter>
::=     <operator>
|       <separator>
|       <bracket>
|       <declarator>
|       <specificator>
```

```
<operator>
::=     <arithmetic operator>
|       <relational operator>
|       <logical operator>
|       <sequential operator>
```

```
<arithmetic operator>
::=     +
|       -
|       ×
|       /
|       ÷
|       ↑

<relational operator>
::=     <
|       ≤
|       =
|       ≥
|       >
|       ≠

<logical operator>
::=     ≡
|       ⊃
|       ∨
|       ∧
|       ¬

<sequential operator>
::=     go to
|       if
|       then
|       else
|       for
|       do

<separator>
::=     ,
|       .
|       ⏨
|       :
|       ;
|       :=
|       ␣
|       step
|       until
|       while
|       comment

<bracket>
::=     (
|       )
|       [
|       ]
|       ‘
|       ’
|       begin
|       end

<declarator>
::=     own
|       Boolean
|       integer
|       real
|       array
|       switch
|       procedure

<specificator>
::=     string
|       label
```

| **value**

The sequence	is equivalent to
; comment *<any sequence of zero or more characters not containing ;>* **;**	**;**
begin comment *<any sequence of zero or more characters not containing ;>* **;**	**begin**

1.3. Identifiers

<identifier>
::=   *<letter>*
| *<identifier> <letter>*
| *<identifier> <digit>*

1.4. Numbers

<unsigned integer>
::=   *<digit>*
| *<unsigned integer> <digit>*

<integer>
::=   *<unsigned integer>*
| **+** *<unsigned integer>*
| **−** *<unsigned integer>*

<decimal fraction>
::=   **.** *<unsigned integer>*

<exponential part>
::= $_{10}$ *<integer>*

<decimal number>
::=   *<unsigned integer>*
| *<decimal fraction>*
| *<unsigned integer> <decimal fraction>*

<unsigned number>
::=   *<decimal number>*
| *<decimal number> <exponential part>*

<number>
::=   *<unsigned number>*
| **+** *<unsigned number>*
| **−** *<unsigned number>*

1.5. Strings

<proper string>
::=   *<any sequence of characters not containing ⌜ or ⌝>*
| *<empty>*

```
<open string>
::=     <proper string>
|       <proper string> <closed string> <open string>

<closed string>
::=     ⌜ <open string> ⌝

<string>
::=     <closed string>
|       <closed string> <string>
```

2. Expressions

```
<expression>
::=     <arithmetic expression>
|       <Boolean expression>
|       <designational expression>
```

2.1. Variables

```
<variable identifier>
::=     <identifier>

<simple variable>
::=     <variable identifier>

<subscript expression>
::=     <arithmetic expression>

<subscript list>
::=     <subscript expression>
|       <subscript list> , <subscript expression>

<array identifier>
::=     <identifier>

<subscripted variable>
::=     <array identifier> [ <subscript list> ]

<variable>
::=     <simple variable>
|       <subscripted variable>
```

2.2. Function designators

```
<procedure identifier>
::=     <identifier>

<actual parameter>
::=     <string>
|       <expression>
|       <array identifier>
|       <switch identifier>
|       <procedure identifier>
```

```
<letter string>
::=     <letter>
|       <letter string> <letter>

<parameter delimiter>
::=     ,
|       ) <letter string> : (

<actual parameter list>
::=     <actual parameter>
|       <actual parameter list> <parameter delimiter> <actual parameter>

<actual parameter part>
::=     <empty>
|       ( <actual parameter list> )

<function designator>
::=     <procedure identifier> <actual parameter part>
```

2.3. Arithmetic expressions

```
<adding operator>
::=     +
|       -

<multiplying operator>
::=     ×
|       /
|       ÷

<primary>
::=     <unsigned number>
|       <variable>
|       <function designator>
|       ( <arithmetic expression> )

<factor>
::=     <primary>
|       <factor>
|       <factor> ↑ <primary>

<term>
::=     <factor>
|       <term> <multiplying operator> <factor>

<simple arithmetic expression>
::=     <term>
|       <adding operator> <term>
|       <simple arithmetic expression> <adding operator> <term>

<if clause>
::=     if <Boolean expression> then

<arithmetic expression>
::=     <simple arithmetic expression>
|       <if clause> <simple arithmetic expression> else <arithmetic
        expression>
```

2.4. Boolean expressions

```
<relational operator>
::=     <
|       ≤
|       =
|       ≥
|       >
|       ≠

<relation>
::=     <simple arithmetic expression> <relational operator> <simple
        arithmetic expression>

<Boolean primary>
::=     <logical value>
|       <variable>
|       <function designator>
|       <relation>
|       ( <Boolean expression> )

<Boolean secondary>
::=     <Boolean primary>
|       ¬ <Boolean primary>

<Boolean factor>
::=     <Boolean secondary>
|       <Boolean factor> ∧ <Boolean secondary>

<Boolean term>
::=     <Boolean factor>
|       <Boolean term> ∨ <Boolean factor>

<implication>
::=     <Boolean term>
|       <implication> ⊃ <Boolean term>

<simple Boolean>
::=     <implication>
|       <simple Boolean> ≡ <implication>

<Boolean expression>
::=     <simple Boolean>
|       <if clause> <simple Boolean> else <Boolean expression>
```

2.5. Designational expressions

```
<label>
::=     <identifier>
|       <unsigned integer>

<switch identifier>
::=     <identifier>

<switch designator>
::=     <switch identifier> [ <subscript expression> ]
```

```
<simple designational expression>
::=     <label>
|       <switch designator>
|       ( <designational expression> )
```

```
<designational expression>
::=     <simple designational expression>
|       <if clause> <simple designational expression> else <designational
        expression>
```

3. Statements

3.1. Compound statements and blocks

```
<unlabelled basic statement>
::=     <assignment statement>
|       <go to statement>
|       <dummy statement>
|       <procedure statement>
```

```
<basic statement>
::=     <unlabelled basic statement>
|       <label> : <basic statement>
```

```
<unconditional statement>
::=     <basic statement>
|       <compound statement>
|       <block>
```

```
<statement>
::=     <unconditional statement>
|       <conditional statement>
|       <for statement>
```

```
<compound tail>
::=     <statement> end
|       <statement> ; <compound tail>
```

```
<block head>
::=     begin <declaration>
|       <block head> ; <declaration>
```

```
<unlabelled block>
::=     <block head> ; <compound tail>
```

```
<unlabelled compound>
::=     begin <compound tail>
```

```
<compound statement>
::=     <unlabelled compound>
|       <label> : <compound statement>
```

```
<block>
::=     <unlabelled block>
|       <label> : <block>
```

```
<program>
```

```
::=     <block>
|       <compound statement>
```

3.2. Assignment statements

```
<destination>
::=     <variable>
|       <procedure identifier>

<left part>
::=     <destination> :=

<left part list>
::=     <left part>
|       <left part list> <left part>

<assignment statement>
::=     <left part list> <arithmetic expression>
|       <left part list> <Boolean expression>
```

3.3. Go to statements

```
<go to statement>
::=     go to <designational expression>
```

3.4. Dummy statements

```
<dummy statement>
::=     <empty>
```

3.5. Conditional statements

```
<if clause>
::=     if <Boolean expression> then

<unconditional statement>
::=     <basic statement>
|       <compound statement>
|       <block>

<if statement>
::=     <if clause> <unconditional statement>

<conditional statement>
::=     <if statement>
|       <if statement> else <statement>
|       <if clause> <for statement>
|       <label> : <conditional statement>
```

3.6. For statements

```
<for list element>
```

```
::=     <arithmetic expression>
|       <arithmetic expression> step <arithmetic expression> until
        <arithmetic expression>
|       <arithmetic expression> while <Boolean expression>
```

```
<for list>
::=     <for list element>
|       <for list> , <for list element>
```

```
<for clause>
::=     for <variable> := <for list> do
```

```
<for statement>
::=     <for clause> <statement>
|       <label> : <for statement>
```

3.7. Procedure statements

```
<actual parameter>
::=     <string>
|       <expression>
|       <array identifier>
|       <switch identifier>
|       <procedure identifier>
```

```
<letter string>
::=     <letter>
|       <letter string> <letter>
```

```
<parameter delimiter>
::=     ,
|       ) <letter string> : (
```

```
<actual parameter list>
::=     <actual parameter>
|       <actual parameter list> <parameter delimiter> <actual parameter>
```

```
<actual parameter part>
::=     <empty>
|       ( <actual parameter list> )
```

```
<procedure statement>
::=     <procedure identifier> <actual parameter part>
```

4. Declarations

```
<declaration>
::=     <type declaration>
|       <array declaration>
|       <switch declaration>
|       <procedure declaration>
```

4.1. Type declarations

```
<type list>
```

```
::=     <simple variable>
|       <simple variable> , <type list>

<type>
::=     real
|       integer
|       Boolean

<local or own>
::=     <empty>
|       own

<type declaration>
::=     <local or own> <type> <type list>
```

4.2. Array declarations

```
<lower bound>
::=     <arithmetic expression>

<upper bound>
::=     <arithmetic expression>

<bound pair>
::=     <lower bound> : <upper bound>

<bound pair list>
::=     <bound pair>
|       <bound pair list> , <bound pair>

<array segment>
::=     <array identifier> [ <bound pair list> ]
|       <array identifier> , <array segment>

<array list>
::=     <array segment>
|       <array list> , <array segment>

<array declarer>
::=     <type> array
|       array

<array declaration>
::=     <local or own> <array declarer> <array list>
```

4.3. Switch declarations

```
<switch list>
::=     <designational expression>
|       <switch list> , <designational expression>

<switch declaration>
::=     switch <switch identifier> := <switch list>
```

4.4. Procedure declarations

```
<formal parameter>
::=     <identifier>

<formal parameter list>
::=     <formal parameter>
|       <formal parameter list> <parameter delimiter> <formal parameter>

<formal parameter part>
::=     <empty>
|       ( <formal parameter list> )

<identifier list>
::=     <identifier>
|       <identifier list> , <identifier>

<value part>
::=     value <identifier list> ;
|       <empty>

<specifier>
::=     string
|       <type>
|       <array declarer>
|       label
|       switch
|       procedure
|       <type> procedure

<specification part>
::=     <empty>
|       <specifier> <identifier list> ;
|       <specification part> <specifier> <identifier list> ;

<procedure heading>
::=     <procedure identifier> <formal parameter part> ; <value part>
        <specification part>

<procedure body>
::=     <statement>

<procedure declaration>
::=     procedure <procedure heading> <procedure body>
|       <type> procedure <procedure heading> <procedure body>
```

5. Transcription of basic symbols

The UTF-8 symbol	is replaced by the ASCII symbol
(	(
)	)
[	[
]	]
,	,

The UTF-8 symbol	is replaced by the ASCII symbol
;	;
:	:
:=	:=
≡	<=>
⊃	=>
∨	\/
∧	/\
¬	~
=	=
≠	<>
<	<
≥	>=
>	>
≤	<=
+	+
−	-
×	*
/	/
÷	//
↑	**
⌜	`
⌝	'
.	.
⏨	e
␣	