8 Other Control Statements

8.1 The LOOP Statement

We now consider the scientific program of Fig. 8.1 which reads two experimental measures and performs certain computations on them. As it stands, this program could cause several problems for the user:

1) If there is an odd number of data points, an error will occur.
2) If \( m_2 \) is less than \( m_{lim} \), the square root cannot be calculated.
3) If \( V_{sqrt} \) is equal to \( v_{lim} \), division is impossible.

One way of solving these problems is to rewrite the program as shown in Fig. 8.2. The defect of such a program, however, is that the variable \( ok \) has to be checked at each step of the loop. A better way of expressing a repetitive state-

```modula2
MODULE Experiment;

FROM InOut IMPORT WriteString;
FROM RealInOut IMPORT ReadReal,WriteReal,Done;
FROM MathLibo IMPORT sqrt,sin,cos;

CONST
    mlim=3.0;
    vlim=5.0;

VAR
    m1,m2, (* measures *)
    Vsincos,Vsqrt,Vquot,Result:REAL;
BEGIN
    Result:=0.0;
    ReadReal (ml);
    WHILE Done DO
        ReadReal (m2) ;
        Vsincos:=sin(ml)+cos(m2);
        Vsqrt:=sqrt(m2-mlim);
        Vquot:=Vsincos/(Vsqrt-vlim);
        Result:=Result+Vquot;
        ReadReal (m1);
    END;
    WriteString(" Result is : ");
    WriteReal (Result,10);
END Experiment.
```

Fig. 8.1 The module Experiment
**MODULE** Experiment;

FROM InOut IMPORT WriteString, Writeln;
FROM RealInOut IMPORT ReadReal, WriteReal, Done;
FROM MathLibO IMPORT sqrt, sin, cos;

**CONST**

\[ m_{\text{l}} = 3.0; \]
\[ v_{\text{l}} = 5.0; \]

**VAR**

\[ m_1, m_2, \quad (\text{* measures *}) \]
\[ V_{\text{sin}c_{\text{o}}s}, V_{\text{s}qrt}, V_{\text{q}uot}, \text{Result:REAL}; \]
\[ \text{ok: BOOLEAN}; \]

**BEGIN**

\[ \text{Result}:=0.0; \]
\[ \text{ReadReal}(m_1); \]
\[ \text{ok}:=\text{TRUE}; \]

**WHILE** Done **AND** ok **DO**

\[ \text{ReadReal}(m_2); \]

**IF NOT** Done **THEN**

\[ \text{ok}:=\text{FALSE}; \]

**ELSE**

\[ V_{\text{sin}c_{\text{o}}s}:=\text{sin}(m_1)+\text{cos}(m_2); \]
\[ \text{IF} \quad m_2 < m_{\text{l}} \text{THEN} \]
\[ \text{ok}:=\text{FALSE} \]

**ELSE**

\[ V_{\text{s}qrt}:=\text{sqrt}(m_2-m_{\text{l}}); \]
\[ \text{IF} \quad V_{\text{s}qrt}=v_{\text{l}} \text{THEN} \]
\[ \text{ok}:=\text{FALSE} \]

**ELSE**

\[ V_{\text{q}uot}:=V_{\text{sin}c_{\text{o}}s}/(V_{\text{s}qrt}-v_{\text{l}}); \]
\[ \text{Result}:=\text{Result}+V_{\text{q}uot}; \]
\[ \text{ReadReal}(m_1); \]

**END;** (** IF **)

**END;** (** IF **)  
**END;** (** WHILE **)  
\[ \text{Writeln}; \]

**IF** ok **THEN**

\[ \text{WriteString(" Result is : ");} \]
\[ \text{WriteReal(\text{Result},10);} \]

**ELSE**

\[ \text{WriteString(" Problem in the data, last m}_2 = ";} \]
\[ \text{WriteReal(\text{m}_2,10);} \]

**END;**  
**END** Experiment.

Fig. 8.2 The module Experiment (Version 2)