



# IEEE Standard ATLAS Test Language



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# **IEEE Standard ATLAS Test Language**

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# Foreword

(This Foreword is not a part of IEEE Std 416-1984, IEEE Standard ATLAS Test Language.)

This standard defines ATLAS, the Abbreviated Test Language for All Systems, which offers a standardized test language for expressing test specifications and test procedures. It is a test-oriented language independent of test equipment, and provides a standard abbreviated English language used in the preparation and documentation of test procedures that can be implemented either manually or with automatic and semi-automatic equipment.

ATLAS was originally developed for avionics applications under the auspices of Aeronautical Radio, Inc (ARINC). As the language expanded into non-avionic applications, the original sponsors recommended the transfer of further ATLAS development to the IEEE. On September 9, 1976, the IEEE Standards Board approved ATLAS as IEEE Standard 416-1976.

Following publication of IEEE Std 416-1976, the IEEE ATLAS Standards Committee continued to expand and improve the language. This Revision 21 of 416 was approved by the IEEE Standards Board on September 22, 1983, and includes the Specification and Formal Syntax that have been maintained in parallel and are incorporated in this volume.

It would be appreciated if readers or users who detect errors, inconsistencies, or contradictions would forward their comments to:

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## 1.0 Purpose

This language specification defines the Abbreviated Test Language for All Systems (ATLAS). The term "all" was substituted for the original "avionics" in recognition of the wider application of the language.

ATLAS is a standard abbreviated English language used in the preparation and documentation of test procedures which can be implemented either manually or with automatic or semi-automatic test equipment.

This document amplifies the formal definition of ATLAS (Chapter 18) by providing functional description and rules applicable to ATLAS constructs over and above the syntactic definition of the language. To provide for a complete, but concise, description of each language construct a reference to the appropriate section(s) of the Formal Syntax of the ATLAS Language (from Chapter 18) together with a diagrammatic representation of the language syntax are included, where deemed appropriate, within this document. The diagrammatic representations are referred to as "syntax diagrams" and are intended to provide a guide in constructing valid ATLAS statements.

## 1.1 ATLAS Characteristics

The following are general characteristics of ATLAS.

### 1.1.1 Unit Under Test Orientation

The language is dedicated to defining the test requirements of the Unit Under Test (UUT) with no reference to nor dependence upon the test equipment which may be used. The latter may be automatic, manual or of hybrid design.

### 1.1.2 Unambiguous Communication

The selective use of English language terms which are compatible with the description of test requirements and a formal structure for their use (as defined in this document) constitute an environment to ensure an unambiguous description of the requirements of a test procedure for the UUT designers, developers, users, and maintenance personnel.

### 1.1.3 Test Equipment Independence

The specification of test requirements in terms of the UUT by ATLAS facilitates the transportability of those test specifications from implementation on one set of test equipment to another, providing that all of the test requirements can be satisfied by the test equipments.

## 1.2 Levels of ATLAS

There are four defined levels of ATLAS: Standard ATLAS, Subset ATLAS, Subset ATLAS with Extensions, and Adapted ATLAS.

### 1.2.1 Standard ATLAS

The complete language, including vocabulary, syntax, and rules, as described in the most recent approved edition of this document (ANSI/IEEE Std 416), is defined as Standard ATLAS.

### 1.2.2 Subset ATLAS

A language of which every constituent construct is included within Standard ATLAS (i.e., no extensions) except that, for commercial or technical reasons, it does not include all the vocabulary or statement and syntactic options of Standard ATLAS, is defined as Subset ATLAS. It is anticipated that each Subset ATLAS would be unique, thus no specific forms of Subset ATLAS are defined in this book.

### 1.2.3 Subset ATLAS with Extensions

A version of ATLAS, based upon an ATLAS subset, as defined in paragraph 1.2.2, which includes non-ATLAS extensions that have been appended to the selected subset in accordance with the rules described later in Section 1.3.3.

### 1.2.4 Adapted ATLAS

Any modifications to Standard ATLAS which do not conform to the rules described in Section 1.3 will result in a designation of Adapted ATLAS for the resulting language. In the past, ATLAS has lacked certain capabilities to facilitate test system implementation, and users modified ATLAS to satisfy requirements unique to particular implementations. Such modifications resulted in the creation of non-standard and totally uncontrolled applications of the language, which included modified vocabulary, semantics, and rules, as well as syntax distortions. The different versions of Adapted ATLAS are normally test-equipment dependent. Adapted ATLAS is non-preferred, as defined in paragraph 2.4.

## 1.3 Rules for Creating ATLAS Subsets and ATLAS Subsets with Extensions

Needs arise when using ATLAS on projects to create subsets of the language for particular applications in order to limit the scope of the language used on these applications in the interest of economy. Needs also arise to extend the content of ATLAS used on particular projects beyond that currently defined in this document (ANSI/IEEE Std 416) because project development time scales demand that an extension is made in advance of the current state of development of the language by the IEEE ATLAS Committee.

Extensions are defined as new language capability, legitimately required for the description or implementation of test procedures, not available in the most current, approved version of this document, and in compliance with the spirit and descriptions of the general characteristics of ATLAS previously provided in Section 1.1. Adaptions, substitutions, or distortions of language elements, constructs, or capabilities are *not* extensions.

Because of users' needs, the IEEE ATLAS Committee recognizes the inevitable creation of ATLAS subsets and ATLAS subsets with extensions. These ground rules have been formulated to ensure the orderly creation of ATLAS subsets and ATLAS subsets with extensions and to limit their proliferation.

### 1.3.1 General Requirements

ATLAS subsets and ATLAS subsets with extensions should be created and maintained by an organization (custodian) that represents a welldefined community of users requiring the subset or subset with extensions. The custodian is the managing body for the subset or subset with extensions and shall provide the necessary technical and logistic support, such as document identification, document maintenance, review and distribution of additions and modifications, rules governing the mechanism for additions and modifications.

### 1.3.2 Rules for Subsets

**1.3.2.1** All subsets of ATLAS must be in accordance with Section 1.2.2 of this document.

**1.3.2.2** No adaptation or distortion of the syntax, vocabulary or the rules of ATLAS is allowed.

**1.3.2.3** A subset of ATLAS can only be created by selecting the required syntax, vocabulary, and rules and their meanings as defined in the most current, approved version of this standard. The subset should be a complete language, having a structure obtained by top-down partitioning of the ATLAS syntax structure. The structure shall be internally consistent (i.e., all structures shall be reducable to language elements and all named elements shall be usable).

**1.3.2.4** The custodian responsible for creating and maintaining a subset of ATLAS is also responsible for ensuring that the subset conforms in all respects to the definition of ATLAS in this document without any adaptation or extension.

**1.3.2.5** A specification shall be created which clearly defines a subset in terms of ATLAS by appropriate reproduction of, or references to, the selected content of the most current, approved version of this document. (Warning: Contact IEEE to make copyright arrangements). All reproduction of the ATLAS standard material shall be by electronic or photographic techniques, where possible to preclude introduction of human errors. The resulting specification shall be provided to the IEEE ATLAS Committee for information purposes.

**1.3.2.6** At the same time that the specification is provided to IEEE, a description of the users and a listing of the types of units under test covered by the specification shall also be provided to the IEEE ATLAS Committee for information purposes.

### 1.3.3 Rules for Subsets with Extensions

**1.3.3.1** All the rules and documentation requirements stated in Sections 1.3.1 and 1.3.2 shall be satisfied.

**1.3.3.2** Whenever existing ATLAS capability, as defined by the most current, approved version of this standard, can satisfy an application requirement, then existing ATLAS must be used. If language elements/constructs are created which do not provide legitimate new language capability required for the description or implementation of test procedures, then any such constructs shall not be identified as extensions created in accordance with these rules.

**1.3.3.3** All extensions to ATLAS shall conform to the ATLAS Test Language Requirements Document.

**1.3.3.4** Each and every extension shall be submitted to the IEEE ATLAS Committee by using the established proposal procedures for consideration as new material to be incorporated into this standard.

**1.3.3.5** All extensions shall be clearly and explicitly identified and defined in the related subset specification prescribed in paragraph 1.3.2.5.

#### **1.4 ATLAS Configuration**

ATLAS is a living language and as a result additions, deletions, and modifications will occur as the language is utilized. To provide configuration identification for and eliminate confusion between various versions of ATLAS, the language should be tagged with that particular "revision" or "level" number of ANSI/IEEE Std 416 used for the language definition (for example, if a compiler was generated from ANSI/IEEE Std 416 level 14, "14" reflects the approved language version used as the basis for the compiler).

## 2.0 Reference Material

### 2.1 Applicable Documents

The following documents are applicable to this specification.

|                 |                                                                                                                                                                            |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IEEE Std 771    | Guide to the Use of ATLAS                                                                                                                                                  |
| X3.12 – 1966    | USA Standards Institute document, "Vocabulary for Information Processing".                                                                                                 |
| ARINC 573       | NRZ Code                                                                                                                                                                   |
| 106 – 71        | Telemetry Standards, Revised January 1971, Telemetry Working Group of the Inter-Range Commanders Council White Sands Missile Range, New Mexico 88002 (see Figure 4, p. 42) |
| ARINC 575       | ARINC Grey Code                                                                                                                                                            |
| X.3.4 – 1968    | USA Standard Code for Information Interchange                                                                                                                              |
| ISO 646 – 1973E | International Standard Seven-Bit Character Set                                                                                                                             |
| ISO 1000        | International Standard Dimensions                                                                                                                                          |

### 2.2 Document Precedence

In case of any conflict in the definition of ATLAS, the following precedence is determined in the order listed:

- (1) IEEE Std 416 (this document), ATLAS Language Specification
  - a. Formal Syntax
  - b. Rules and Descriptions
  - c. Syntax Diagrams
  - d. Notes and Examples
- (2) IEEE Std 771, Guide to the Use of ATLAS

### 2.3 How to Use This Specification

#### 2.3.1 Structure

This document is organized in paragraphs which represent the major elements of ATLAS. The paragraph organization is shown in Table 2-1.

**Table 2–1. ATLAS Specification Organization**

| Chapter    | Title                                            | Topic                                                                                                                                |
|------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| 3.0        | ATLAS Test Specification                         | The structure of an ATLAS test specification, including the main sections, their allowed order, and statement structure.             |
| 4.0        | Structure Delimiter Statements                   | ATLAS statements which serve to delimit the test specification sections.                                                             |
| 5.0        |                                                  | Reserved for future use.                                                                                                             |
| 6.0        | Preamble Statements                              | ATLAS statements which are only allowed in a Preamble Section.                                                                       |
| 7.0        | Procedural Statements                            | ATLAS procedural statement structure.                                                                                                |
| 8.0        | Procedural Statements, Data Processing           | ATLAS statements which are concerned with data processing functions.                                                                 |
| 9.0        | Procedural Statements, Input/Output              | ATLAS statements which are concerned with input/output functions.                                                                    |
| 10.0       | Procedural Statements, Control                   | ATLAS statements which are concerned with control of the execution of the test specification.                                        |
| 11.0       | Procedural Statements, Signal                    | ATLAS statements which are concerned with the application and measurement of signals.                                                |
| 12.0       | Procedural Statements, Timing                    | ATLAS statements which are primarily concerned with timing.                                                                          |
| 13.0       | Procedural Statements, Macros                    | ATLAS statements which are MACRO functions.                                                                                          |
| 14.0       | Field and Subfield Definition                    | Definition of the major fields and subfields of ATLAS statements.                                                                    |
| 15.0       | Language Component Specification                 | Definition of the fundamental language components of the ATLAS statements, fields, and sub-fields.                                   |
| 16.0       | Nouns                                            | Definition of the nouns (i.e., signals) and identification of the associated modifiers in ATLAS.                                     |
| 17.0       | Noun Modifiers                                   | Definition of the noun-modifiers (i.e., signal characteristics) for the ATLAS nouns.                                                 |
| 18.0       | ATLAS Formal Definition                          | Definition of syntax and semantics of ATLAS                                                                                          |
| Appendix A | Cross Reference List of Syntax-Variables         | Cross Reference lists for rule names and literals.                                                                                   |
| Appendix B | New Syntax-Variable Names and their Counterparts | Description of the new names; hyphenated names, old abbreviations replaced by full names and newly introduced syntax-variable names. |

### 2.3.2 Terminology

Formal ATLAS words and characters are written throughout this Specification in all uppercase letters. Formal ATLAS words and characters are all that an automatic compiler is expected to understand.

In describing the syntax of the language, words or phrases were developed which are peculiar to the ATLAS definition, but which should not be written in ATLAS test specifications. These words are written in italic (e.g., *value*) when used in this manner.

NOTE: Words and phrases identified by italicization in IEEE Std 416 Chapters 1 – 17 do not necessarily have the same correspondence in Chapter 18. The differences are due to technical reasons, but the meaning is the same and the correspondence is obvious.

This Specification contains many non-ATLAS words which are in common use in the automatic data processing community. Extensive use has been made of the ANSI document X3.12-1966 entitled "Vocabulary for Information Processing".

### 2.3.3 How to Read the Formal Syntax

See the Introduction to the ATLAS Formal Definition (Chapter 18).

### 2.3.4 How to Read Syntax Diagrams

#### 2.3.4.1 Capital Letters

All capital letters represent themselves. (e.g., CNX represents CNX in an ATLAS statement.)

#### 2.3.4.2 Lower Case Letters

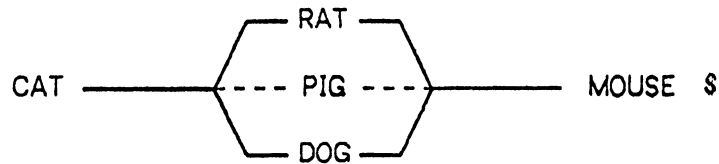
Words in lower-case letters that are italicized represent various statement elements. These statement elements are all defined in terms of formal ATLAS words or characters in this Volume.

#### 2.3.4.3 Other Characters

All other characters, such as the currency symbol (\$), slash(/), etc. represent themselves.

#### 2.3.4.4 Syntax Diagram Notation

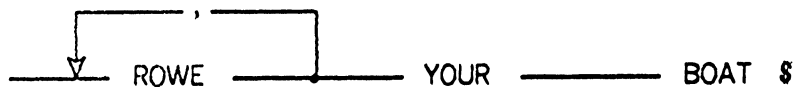
The syntax diagram notation employs lines similar to flowcharting lines to show how elements may be put together to form complete statements. A broken line represents a path which may only be followed in statements in a Preamble, but the solid line paths may be followed for any statement. Flow lines must be followed from left to right except where an arrowhead on the line indicates an exception, such as a feedback loop. The following syntax drawing is an example:



tells us that CAT RAT MOUSE\$ and CAT DOG MOUSE\$ are legitimate statements, but CAT PIG MOUSE is only permitted in Preamble statements. Requirements for spaces as delimiters are not shown in syntax drawings since spaces are generally not significant in ATLAS. Any precise space requirements are specified in the Formal Syntax.

The next syntax diagram example uses a feedback loop to indicate the repetition of an element and defines statements such as:

ROWE YOUR BOAT\$  
ROWE, ROWE YOUR BOAT\$  
ROWE, ROWE, ROWE YOUR BOAT\$



#### 2.3.4.5 Procedural Statement Diagrams

The diagrams of procedural statements themselves are illustrated as they would appear after all substitutions for pre-defined segments of the statement are made. For example, all or part of MEASURE statement could be represented by a *function* label in an actual procedural statement.

### 2.3.4.6 Sub-Diagrams

To avoid repetition of certain statement elements which are common to several statement diagrams, these elements are diagrammed as subdiagrams and referenced in other diagrams by the associated lower-case letter word enclosed in a broken border.

Also included in the broken border is a set of characters which identify the paragraph in this Volume where that element is defined. For example:



means that the sub-element *conn* is defined in paragraph 14.23.

When a subdiagram is defined in a Syntax Diagram (in terms of other subdiagrams or ATLAS reserved words), the border around the subdiagram is solid.

### 2.3.5 Relationship of Formal Syntax to Syntax Diagrams

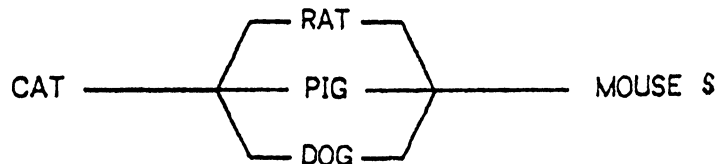
The following examples illustrate the relationships between the Formal Syntax and Syntax Diagrams.

#### 2.3.5.1 Example 1—Alternative Syntax Elements

Formal Syntax cat-stmt:

"CAT" {"RAT" | "PIG" | "DOG"} "MOUSE" stmt-terminator;

Syntax Diagram

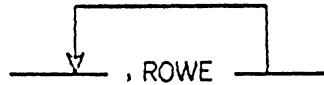


The Syntax Diagram shows at a glance that CAT may be followed by RAT or PIG or DOG, any one of which may be followed by MOUSE. The Formal Syntax shows the requirement for blanks between the statement elements by referring to the metalinguistic variable *sfd*. The variable name *cat-stmt* will be referred to in a higher level construct.

### 2.3.5.2 Example 2—Replication

Formal Syntax    rowe-field:  
                  {fd "ROWE"} % ;

Syntax Diagram



This example illustrates that ROWE may be repeated one or more times preceded by the field delimiter (.).

## 2.4 Identification of Non-Preferred Usage

From time to time, elements become part of ATLAS which are subsequently determined to be superfluous or troublesome in real use. These non-preferred elements should not be used in new ATLAS application efforts so that deletion of these elements from the language will have a minimal impact on language standardization. Such non-preferred ATLAS language elements are herein designated by the term "Non-Preferred" appearing in parentheses immediately following the element name in the section where it is described.

### 3.0 ATLAS Test Specification

An *atlas test specification* is wholly dedicated to defining the test requirements for the Unit-Under-Test in a manner which is independent of the test equipment used for its implementation. The actual implementation may use manual test equipment, automatic test equipment, or a combination of both.

The *atlas test specification* may be viewed as specifying a set of resources required to test the Unit-Under-Test. These resources are termed "virtual resources", since they cite only test requirements of the Unit-Under-Test and not the actual resources used for implementation. ATLAS provides an optional capability for either implicitly or explicitly specifying these virtual resources.

Virtual resources are explicitly specified when the test procedure writer establishes and labels a summary for the desired signal oriented test capacity through use of a REQUIRE statement in the *program preamble structure*. The *requirement* label thus established is written in the *noun field* of all ATLAS statements which reference the virtual resource associated with this test capacity. The *requirement* label also provides a linking mechanism for equating the virtual resources to the actual test resources used for implementation of the *atlas test specification*. A virtual resource is implicitly specified when the test procedure writer chooses not to label and summarize the desired test capacity in a REQUIRE statement. In this case, the resource requirements must be established by a detailed analysis of the entire *atlas test specification*.

The implementation of an *atlas test specification* requires a checking and equation of the virtual resources defining the test requirements for the Unit-Under-Test to the actual test resources comprising a particular configuration of manual or automatic test equipment. The process often requires additional information related to the detailed test characteristics of a particular test equipment which are not known to the test procedure writer of the *atlas test specification*. The implementation structure is thus outside the scope of the *atlas test specification structure* as shown in Figure 3-1. This specification defines only the *atlas test specification structure*. The implementation structure will not be considered further in this specification.

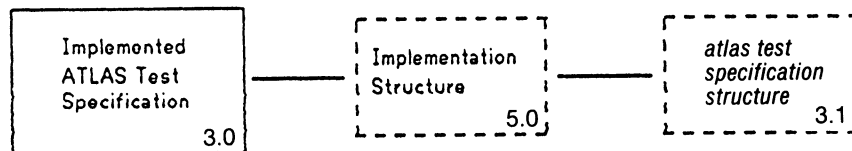


Figure 3-1. Implemented ATLAS Test Specification

#### 3.1 *atlas test specification structure*

The document or set of documents which records the task to be applied to a UUT, and which may fulfill the requirement for a test specification, a test procedure or a test program, is called an *atlas test specification structure*. An *atlas test specification structure* consists of one *atlas program structure* and optionally of any number of *atlas module structures* and *non-atlas module structures*.

ATLAS and NON-ATLAS Modules exist as entities separate from the *atlas program structure* and form part of the *atlas test specification structure* preamble. They are linked together as a result of the INCLUDE statements in the *atlas program structure*.

ATLAS and NON-ATLAS Modules provide a facility for preparing a large *atlas test*

*specification structure* in a number of smaller manageable portions with a controlled interface. Some portions may be shared between two *atlas test specification structures* by being referenced in INCLUDE statements in both programs.

Figure 3-2 illustrates the structure of an ATLAS test specification and identifies the section where each structure is defined in this specification.

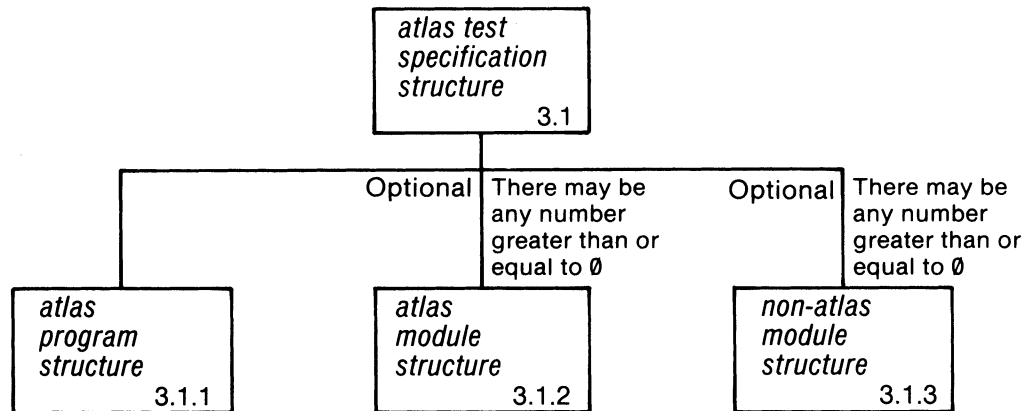


Figure 3-2. ATLAS Test Specification Family Tree

### 3.1.1 *atlas program structure*

An *atlas program structure* consists of five distinct elements; the *begin atlas program statement* serving to delimit the start of the structure, a *program preamble structure*, a *commence main procedure statement* serving to delimit the start of main procedure, the *main procedural structure* and the *terminate atlas program statement* serving to delimit the end of the structure.

The *program preamble structure* precedes the *main procedural structure*.

Program preamble statements do not cause any tests to be executed, but the information contained in the program preamble may be referenced in the procedural section, any *atlas module structure* and any *non-atlas module structure*.

The program preamble also contains references to information contained in any *atlas module structure* and *non-atlas module structure*.

The *main procedural structure* is where the execution of the test procedure starts.

Figure 3-3 illustrates the structure of an ATLAS program and identifies the section where each structure or statement is located in this specification.

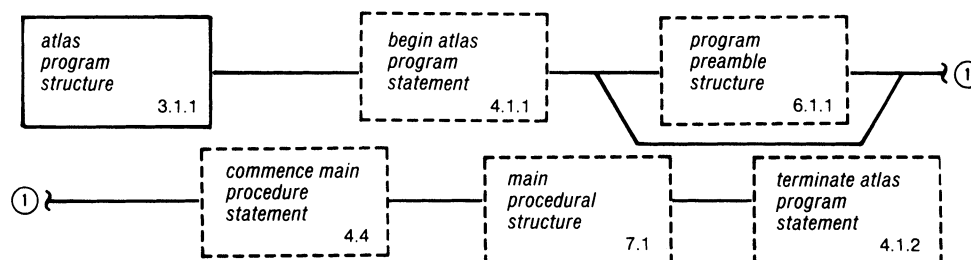


Figure 3-3. ATLAS Program Structure

### 3.1.2 *atlas module structure*

An *atlas module structure* consists of three distinct elements; the *begin atlas module statement* serving to delimit the start of the structure, the *module preamble structure*, and the *terminate atlas module statement* serving to delimit the end of the structure.

Module preamble statements do not cause any tests to be executed, but the information described in the module preamble may be referenced in a *program preamble structure*, any *atlas module structure* and any *non-atlas module structure*. The module preamble also contains references to information contained in the *program preamble structure*, in other *atlas module structures*, and *non-atlas module structures*.

Figure 3–4 illustrates the structure of an ATLAS module and identifies the section where each structure or statement is located in this specification.

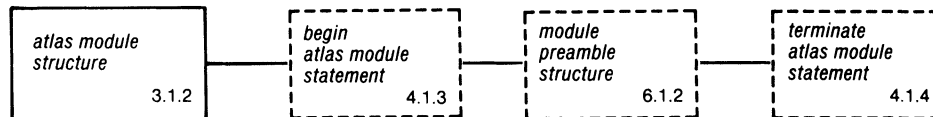


Figure 3–4. ATLAS Module Structure

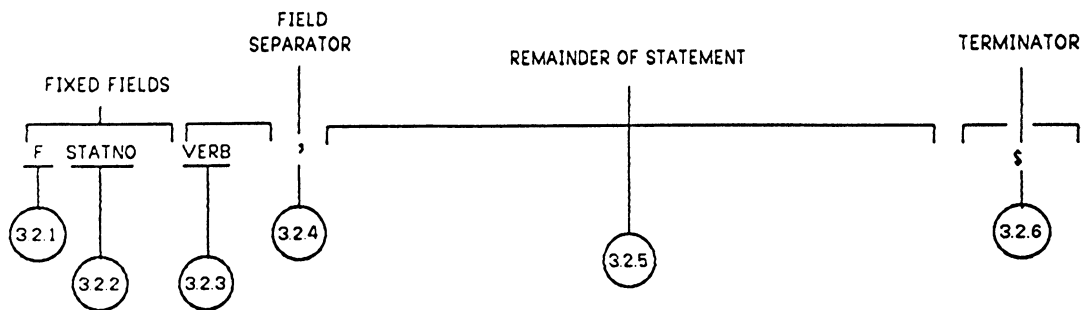
### 3.1.3 *non-atlas module structure*

A *non-atlas module structure* contains those parts of an *atlas test specification structure* which cannot be expressed using the current issue of this standard. Labels established in an *atlas program structure* or *atlas module structure* can be referenced in the *non-atlas module structure* in an implementation dependent way. The rules of section 15.6.1 apply to the scope of labels within non-atlas modules. New labels may be introduced in an implementation dependent way in a *non-atlas module structure*. These labels can be referenced in an *atlas program structure* or *atlas module structure* by defining or declaring them as external.

(Note: Although the use of non-atlas modules is totally implementation dependent attention is drawn to the necessity for each implementation to have a means of ensuring correspondence between labels in ATLAS and NON-ATLAS structures).

### 3.2 Basic Statement Elements

The structure of a general ATLAS statement is shown in Figure 3-4. The detailed format for each verb-type is specified in the appropriate section of this document. There is no limit to the length of an ATLAS statement. It is not necessary to complete the statement in one line. By inserting spaces between statement elements (as allowed by paragraph 15.4), the writer can begin a new line at any point in the statement with subsequent lines indented, if desired. This flexibility allows the writer to highlight some portion of the statement (such as the label) by its location on the page. The first three fields (flag, statement number, and verb) must be written on the first row as required by the format.



Note: Numbers in circles refer to paragraphs in this specification.

**Figure 3-4. General ATLAS Statement Structure**

#### 3.2.1 Flag Field

The flag field can be used to associate special meaning to an ATLAS statement or to designate the beginning of a line of text which is commentary (see 15.3.2).

#### 3.2.2 Statement Number Field

The statement number field is used to uniquely designate ATLAS statements (see 15.3.3).

#### 3.2.3 Verb Field

The verb field identifies the test or data processing action for each statement. The ATLAS verbs are reserved words (i.e., have unique and special meanings in the ATLAS language, and must not be used as variable names) and are defined as part of each statement.

#### 3.2.4 Field Separator

Since the fields following the verb are variable, a separator is required to identify the start of each new major field. A comma followed by zero or more spaces is designated for this purpose. Within some major fields, blank spaces are used as subfield separators (see 15.4).

### 3.2.5 Remainder of Statement

This part of each particular type of ATLAS statement varies considerably. The detailed format following each verb-type is specified in the appropriate section of this document.

### 3.2.6 Statement Terminator (\$)

The last character of every ATLAS statement will be the currency symbol (\$).

## 3.3 Manual Actions During Testing

A test requirement written in ATLAS is independent of the method of test, namely manual or automatic. However, the interpretation and means of execution of the ATLAS statements are dependent on the test method.

When using automatic test methods the Automatic Test Equipment (ATE) will implement all the statements except those which include MANUAL INTERVENTION or MANUAL DATA. For statements containing manual instruction the operator will either:

- a. operate a control on the UUT, or
- b. act directly as a sensor, or
- c. input data to the test equipment, or
- d. receive data from the test equipment, or
- e. record data for test documentation.

When using manually operated test methods the operator will implement all statements in the test requirement, not merely those containing MANUAL INTERVENTION, or MANUAL DATA.

Whenever a manual action is required during an automatic test procedure the test operator must be instructed. The ATE provides this instruction by implementing any of the ATLAS statements which use the verb DISPLAY, INDICATE, PRINT in conjunction with the noun MESSAGE. If permanent records of these messages are required, the verb RECORD is used in conjunction with the noun MESSAGE.

For ATE implementations, the test operator performs the manual action for statements which contain the verbs:

WAIT FOR used in conjunction with either noun MANUAL INTERVENTION or MANUAL DATA.

TO REACH used with the noun MANUAL INTERVENTION.

MONITOR which includes an implicit WAIT FOR MANUAL INTERVENTION, the nature of which must have been conveyed to the test operator by a previous DISPLAY, INDICATE or PRINT MESSAGE statement.

## 4.0 Structure Delimiter Statements

### 4.1 BEGIN/TERMINATE Statements

The BEGIN and TERMINATE statements indicate the first and last statement of an *atlas* program structure or *atlas* module structure.

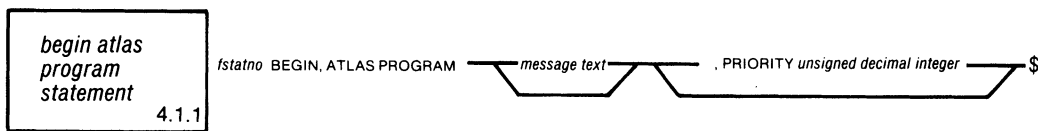
#### 4.1.1 *begin atlas program statement*

##### 4.1.1.1 Function

To indicate the start of the text of an *atlas* program structure and to assign a priority number to the *main procedural structure* if tasks occur within the whole *atlas* specification structure.

##### 4.1.1.2 Formal Syntax

##### 4.1.1.3 Syntax Diagram



##### 4.1.1.4 Rules

1. The first statement of every *atlas* program structure is a *begin atlas program statement*. This statement can be used only once within a single *atlas* program structure.
2. The optional *message text* is to identify this *atlas* program structure.
3. The PRIORITY field must be written if there are any tasks within the whole *atlas* test specification structure. It assigns a numerical priority to the *main procedural structure* according to Rule 9 of section 6.11.2.4.

##### 4.1.1.5 Notes and Examples

110000 BEGIN, ATLAS PROGRAM 'SERVO-AMPLIFIER'\$

#### 4.1.2 *terminate atlas program statement*

##### 4.1.2.1 Function

To indicate the end of the text of an *atlas* program structure.

##### 4.1.2.2 Formal Syntax

##### 4.1.2.3 Syntax Diagram



#### 4.1.2.4 Rules

1. The last statement in every *atlas program structure* is a *terminate atlas program statement*. This statement can be used only once within a single *atlas program structure*.
2. The optional *message text* is to identify the *atlas program structure*.

#### 4.1.2.5 Notes and Examples

999999 TERMINATE, ATLAS PROGRAM 'SERVO-AMPLIFIER'\$

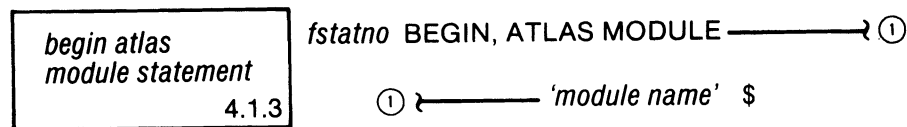
#### 4.1.3 *begin atlas module statement*

##### 4.1.3.1 Function

To indicate the start of the text of an *atlas module structure*.

##### 4.1.3.2 Formal Syntax

##### 4.1.3.3 Syntax Diagram



##### 4.1.3.4 Rules

1. The first statement of every *atlas module structure* is a *begin atlas module statement*. This statement can be used only once within a single *atlas module structure*.
2. The *module name* is to identify the *atlas module structure*, and is referenced by an INCLUDE statement within the *program preamble structure*.
3. The *module name* has to be unique within one *atlas test specification structure*.

##### 4.1.3.5 Notes and Examples

120000 BEGIN, ATLAS MODULE 'CALIBRATION-PROCS' \$

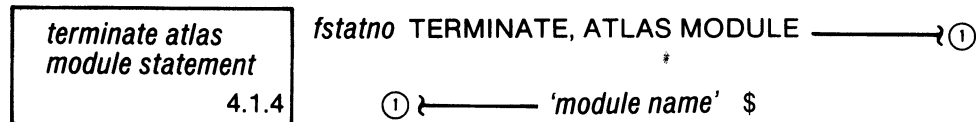
#### 4.1.4 *terminate atlas module statement*

##### 4.1.4.1 Function

To indicate the end of the text of an *atlas module structure*.

##### 4.1.4.2 Formal Syntax

#### 4.1.4.3 Syntax Diagram



#### 4.1.4.4 Rules

1. The last statement in every *atlas module structure* is a *terminate atlas module statement*. This statement can be used only once within a single *atlas module structure*.
2. The *module name* is to identify the *atlas module structure*, and must be identical with the *module name* in the *begin atlas module statement* of the same *atlas module structure*.

### 4.2 Block Definition

This paragraph and paragraphs 10.1 through 10.4 define the structures which permit the ATLAS User to write well structured test specifications. Their use is preferable to other ATLAS control statements (e.g., REPEAT, GO TO). It is incorrect to write structures which are not wholly contained within outer structures. For example, if an IF-THEN statement appears between a WHILE-THEN and its associated END, WHILE, then the associated END, IF must appear prior to the END, WHILE.

#### 4.2.1 block structure

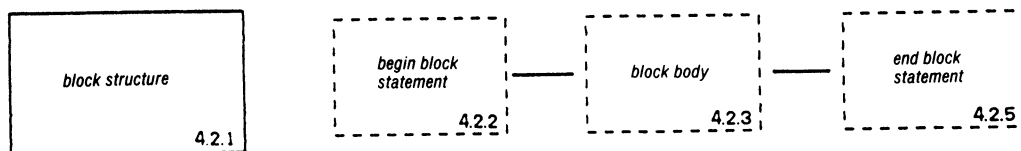
##### 4.2.1.1 Function

Procedural blocks are used to establish non-interfering program structures of the desired hierarchical levels. From the structural aspect a block may be considered as a single statement, in fact the block structure is referred to as a "compound statement" in other programming languages. A block may appear at any point within the main procedural section or within the procedural body of a TASK or PROCEDURE of an ATLAS test specification.

A block consists of three distinct parts; the BEGIN, BLOCK statement serving to delimit the start of the block, the body of the block and finally the END, BLOCK statement to delimit the end of the block.

##### 4.2.1.2 Formal Syntax

##### 4.2.1.3 Syntax Diagram



#### 4.2.1.4 Rules

1. Blocks may appear anywhere within an ATLAS procedural specification including within the body of other blocks thus allowing hierarchical structures at any desired level.
2. The body of a block must not contain entry points (E-Flags), however, the BEGIN, BLOCK statement may be an entry point if it appears within the main procedural section and is not nested within any other block structure.
3. Blocks are non-interfering stand-alone structures. As a result, statement number references from within the block body may only reference statement numbers within that body. Conversely statement numbers within a body may not be referenced from outside that body.

#### 4.2.1.5 Notes and Examples

```
BEGIN, BLOCK, 'TESTER'$      begin block statement
    DECLARE, ----$           block body
    DECLARE, ----$
    ----
    ----
    COMPARE, ----$
    GO TO, -----$
END, BLOCK, 'TESTER'$      end block statement
```

It is recommended that statements within a *block body* be indented, starting with the verb, in order to provide a clear visual indication of the *test specification structure*. Structures within other structures should be further indented so that all structural levels are clearly represented.

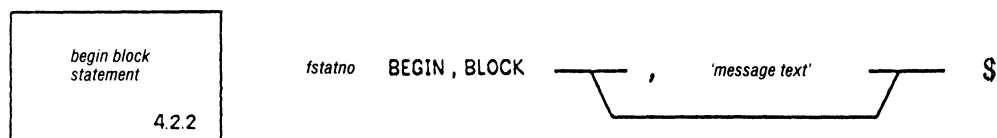
#### 4.2.2 *begin block statement*

##### 4.2.2.1 Function

The BEGIN, BLOCK statement establishes and identifies the start of a block. The optional block title is purely commentary, although the use of descriptive block titles for higher-order blocks is strongly recommended.

##### 4.2.2.2 Formal Syntax

##### 4.2.2.3 Syntax Diagram



##### 4.2.2.4 Rules

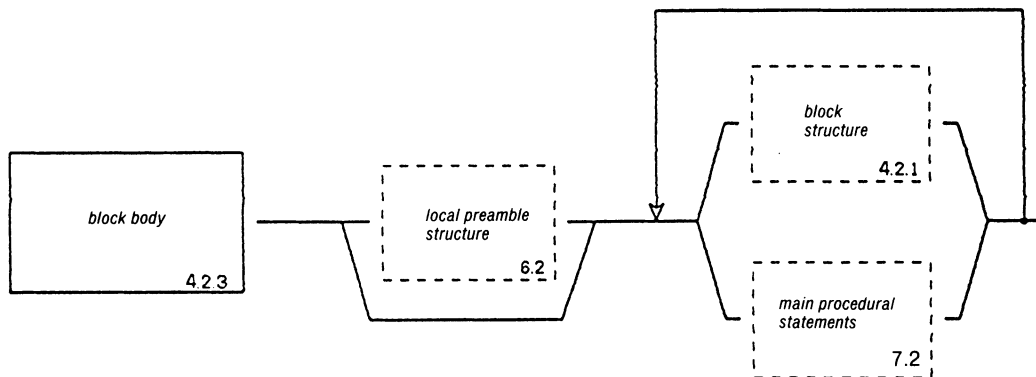
1. Each BEGIN, BLOCK statement must have a corresponding END, BLOCK statement.

**4.2.2.5 Notes and Examples**

BEGIN, BLOCK, 'POWER SUPPLY TESTS'\$

**4.2.3 block body****4.2.3.1 Function**

The block body consists of an optional local preamble which may contain only DECLARE statements where "local" data items may be declared. The following procedural section contains one or more procedural ATLAS statements which describe the desired logic.

**4.2.3.2 Formal Syntax****4.2.3.3 Syntax Diagram****4.2.3.4 Rules**

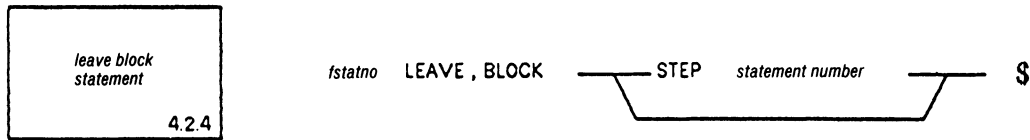
1. Labels declared within the block preamble are local to that block and global to any blocks nested within that block.
2. Labels referenced within a block which are neither declared within that block, nor in some outer block, nor in the main program preamble are invalid references.
3. Labels referenced within a block which are not declared in that block but were declared in either an outer block or in the main program preamble relate to the most recent outer block's meaning.
4. The block body may not contain any entry points.

**4.2.4 leave block statement****4.2.4.1 Function**

Causes execution of a BLOCK to terminate prior to normal sequential execution of the END, BLOCK statement.

**4.2.4.2 Formal Syntax**

#### 4.2.4.3 Syntax Diagram



#### 4.2.4.4 Rules

1. A *statement number* reference, when used, must refer to a BEGIN, BLOCK statement of a block which contains the LEAVE, BLOCK statement.
2. When a *statement number* reference is not used, the LEAVE, BLOCK statement refers to the inner most BLOCK containing the LEAVE, BLOCK statement.
3. When a LEAVE, BLOCK statement is executed, control is transferred to the END, BLOCK statement which corresponds to the referenced BEGIN, BLOCK statement.
4. Any structure containing the LEAVE, BLOCK which is itself contained within the referenced BLOCK, is also exited upon execution of the LEAVE, BLOCK statement.

**4.2.4.5 Notes and Examples**

```

200000 BEGIN, BLOCK$
    10 APPLY, AC SIGNAL . . . $
    20 MEASURE, (TIME), TIME INTERVAL. . . $
    30 START, TIME INTERVAL $
    40 BEGIN, BLOCK, 'HEATING-UP TIME TEST'$
    50 CALCULATE, 'T'=0$
    60 WHILE, 'T' LT 200, THEN$
    65 READ, (TIME), TIME INTERVAL, TIME MAX 190 SEC$
    70 STOP, TIME INTERVAL$
    80 IF, 'MEASUREMENT' GT 180 SEC, THEN$
    90 DISPLAY, MESSAGE, TEMP IS LOW AFTER 3 MIN$
200100 LEAVE, BLOCK$
    10 END, IF$
    20 MEASURE, (TEMP INTO 'T'), HEAT. . . $
    30 END, WHILE$
.
.
.
200200 MEASURE, (TEMP INTO 'T'), HEAT. . . $
    10 IF, 'T' GT 250, THEN$
    20 DISPLAY, MESSAGE, HIGHTEMPERATURE$
    30 DISABLE, TIME INTERVAL$
    40 LEAVE, BLOCK STEP 200000$
    50 END, IF$
.
.
.
200500 END, BLOCK, 'HEATING-UP TIME TEST'$
    10 DISABLE, TIME INTERVAL$
    20 END, BLOCK$
    30 REMOVE, STEP 200010$

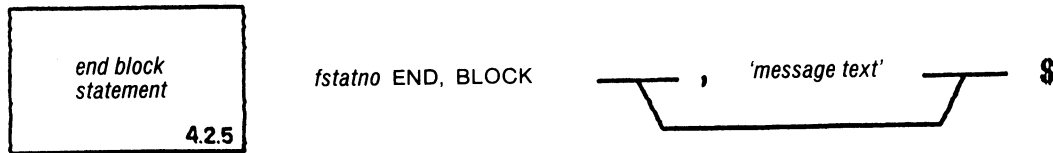
```

**4.2.5 end block statement****4.2.5.1 Function**

The *end block statement* establishes and identifies the end of a block. The optional block title field is purely commentary, although the use of descriptive block titles to match the title appearing within the equivalent BEGIN, BLOCK statement is recommended.

**4.2.5.2 Formal Syntax**

#### 4.2.5.3 Syntax Diagram



#### 4.2.5.4 Rules

1. Each END, BLOCK statement must have a corresponding BEGIN, BLOCK statement.

#### 4.2.5.5 Notes and Examples

END, BLOCK, 'POWER SUPPLY TESTS'\$

### 4.3 LEAVE/RESUME ATLAS (Non-preferred)

The LEAVE ATLAS and RESUME ATLAS statements delimit, for compiling operations, any portion of a procedure which is not written in ATLAS.

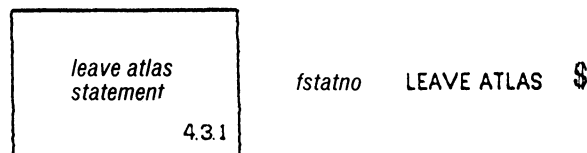
#### 4.3.1 *leave atlas statement*

##### 4.3.1.1 Function

To delimit, for compiling operations, any portion of a procedure which is not written in ATLAS.

##### 4.3.1.2 Formal Syntax

##### 4.3.1.3 Syntax Diagram



##### 4.3.1.4 Rules

1. When it is necessary to include NON-ATLAS segments in a test procedure, the segment will be preceded by a LEAVE ATLAS statement.
2. The verb is written alone with no noun or modifier.
3. The character string RESUME ATLAS should not be used in the NON-ATLAS segment of this statement except for the purpose of returning to ATLAS.

**4.3.1.5 Notes and Examples**

1. This capability will normally be used for descriptions of testing functions which cannot be expressed in ATLAS or which cannot be translated by the compiler being used:

```
555678 LEAVE ATLAS $
ADWG %$* 10111001011101000
555679 RESUME ATLAS $
```

**4.3.2 resume atlas statement****4.3.2.1 Function**

To delimit, for compiling operations, any portion of a procedure which is not written in ATLAS.

**4.3.2.2 Formal Syntax****4.3.2.3 Syntax Diagram****4.3.2.4 Rules**

1. When it is necessary to include NON-ATLAS segments in a test procedure, the segment will be followed by a RESUME ATLAS statement.
2. The verb is written alone with no noun or modifier.
3. The character string RESUME ATLAS should not be used in the NON-ATLAS segment of this statement except for the purpose of returning to ATLAS.

**4.3.2.5 Notes and Examples**

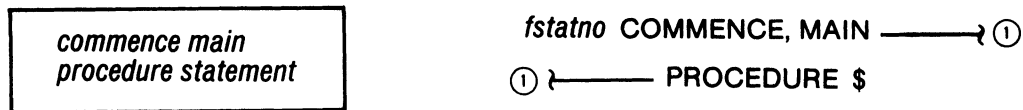
See 4.3.1.5.

**4.4 commence main procedure statement****4.4.1 Function**

The *commence main procedure statement* establishes and identifies the start of the *main procedural structure*.

**4.4.2 Formal Syntax**

#### 4.4.3 Syntax Diagram



#### 4.4.4 Rules

1. There must be one and only one *commence main procedure statement* in the ATLAS program.
2. The *commence main procedure statement* is a directive and is not an executable statement.
3. The flag field portion of the *fstatno* field in a **COMMENCE** statement must be either blank or an E.
4. If a flag statement, as defined in 15.3.2 is used immediately prior to the **COMMENCE** statement, it may only be of type C or E.

## 5.0

This paragraph is reserved for the future growth of ATLAS.

## 6.0 Preamble Statements

An *atlas test specification structure* may contain a single *main preamble structure*, and each *define procedure structure*, *define task structure* or *block structure* may contain a single *local preamble structure*. In each case the preamble serves to identify the names and attributes of each *label* which is subsequently referenced within the appropriate structure.

Within the *atlas preamble structure* labels may be established for use in the *atlas program structure*, an *atlas module structure* or a *non-atlas module structure*. These labels are generally classified as follows:

1. Global

A label is global in scope if it has been established with the GLOBAL attribute in one of the structures mentioned above and with the EXTERNAL attribute in the others in which it is to be referenced.

2. Local

A label is local in scope if it is established with neither the GLOBAL nor EXTERNAL attribute. It may then only be accessed within the structure in which it was established.

A full description of global and local attributes is located in Section 15.6.1.

## 6.1 MAIN PREAMBLE STRUCTURE

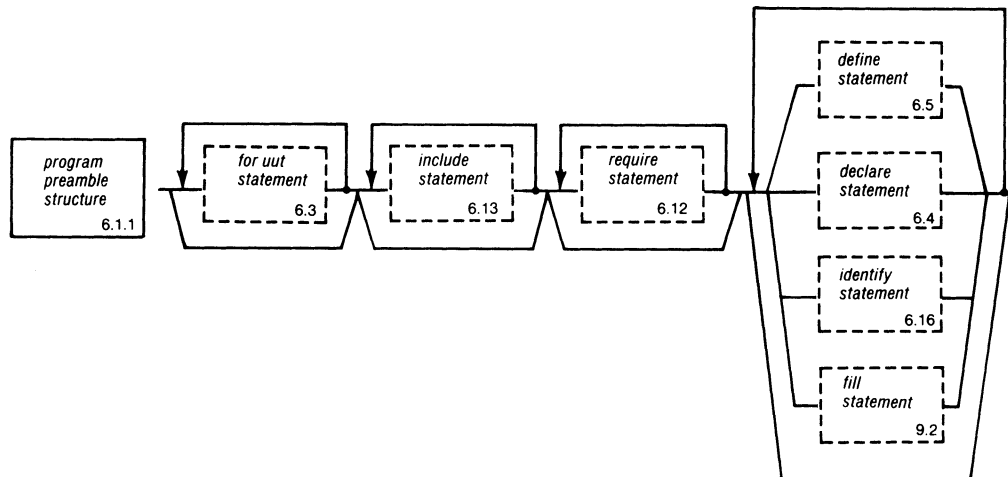
### 6.1.1 *program preamble structure*

#### 6.1.1.1 Function

The *program preamble structure*, which appears immediately following the *begin atlas program statement*, establishes the name and attributes for global labels where the scope includes the whole of the *atlas program structure*.

#### 6.1.1.2 Formal Syntax

### 6.1.1.3 Syntax Diagram



### 6.1.1.4 Rules

1. There may be only one *program preamble structure* within an entire *atlas program structure*.
2. The *program preamble structure* must appear immediately following the BEGIN, ATLAS PROGRAM statement.
3. The *program preamble structure* is delimited by a COMMENCE MAIN PROCEDURE statement which indicates the beginning of the *main procedural structure*.
4. The sequence of statements within the *program preamble structure* starts with *for uut statements*, followed by *include statements*, followed by *require statements*, followed by any sequence of *define statements*, *declare statements*, *identify statements* or *fill statements*. Each of these statement types is optional, thus, the *program preamble structure* may be empty.
5. Any *label* identified within the *program preamble structure* can be referenced within the entire *atlas program structure* unless an identical *label* is established at a lower level structure within a *local preamble structure*.

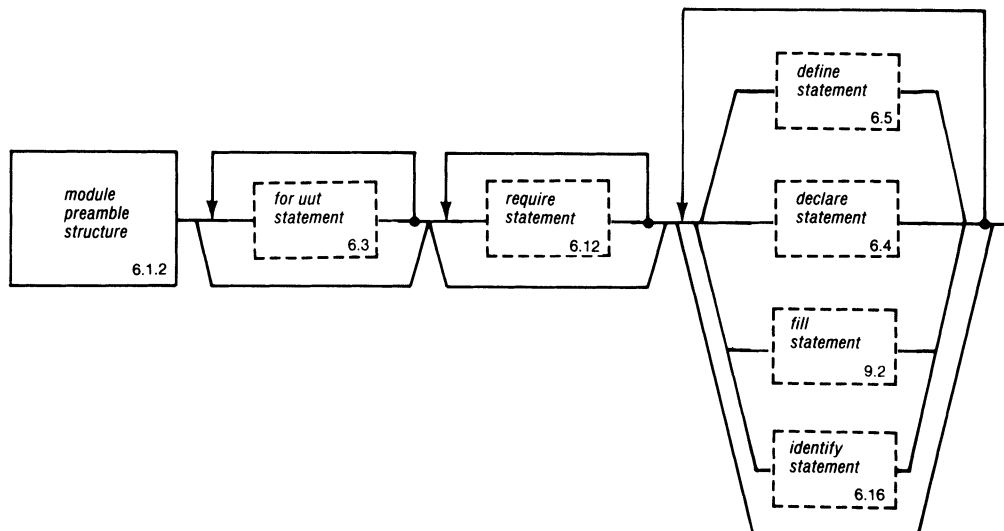
### 6.1.2 module preamble structure

#### 6.1.2.1 Function

The *module preamble structure* which appears immediately following the BEGIN, ATLAS MODULE statement establishes the name and attributes for global labels whose scope includes the whole of the module structure.

#### 6.1.2.2 Formal Syntax

### 6.1.2.3 Syntax Diagram



### 6.1.2.4 Rules

1. There may be only one *module preamble structure* within an entire *atlas module structure*.
2. The sequence of statements within the *module preamble structure* starts with FOR UUT statements, followed by REQUIRE statements, followed by any sequence of DEFINE statements, DECLARE statements or FILL statements.
3. Any *label* identified within the *module preamble structure* can be referenced within the entire *atlas module structure* unless an identical *label* is established at a lower level structure within a *local preamble structure*.

Those labels identified as being GLOBAL can be referenced from other modules or the *atlas program structure* if identified therein as being EXTERNAL.

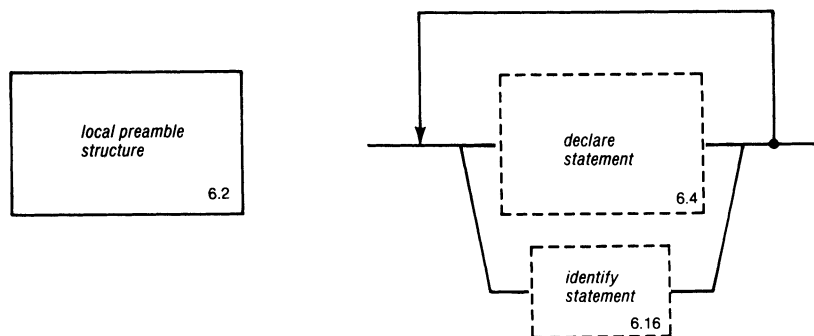
## 6.2 *local preamble structure*

### 6.2.1 Function

A *local preamble structure* may introduce the body of a *block structure*, *define procedure structure*, or *define task structure* and serves to identify the name and attributes of each *label* which is local to the appropriate structure and global to any structures which are nested within that structure unless an identical *label* is established within the *local preamble structure* of those lower level structures. A *local preamble structure* may contain only DECLARE and IDENTIFY statements.

### 6.2.2 Formal Syntax

### 6.2.3 Syntax Diagram



### 6.2.4 Rules

1. There may only be one *local preamble structure* within each *block*, *define task structure*, *define procedure structure* or *function body*.
2. The *local preamble structure* must appear immediately following a *DEFINE PROCEDURE*, *DEFINE TASK*, *BEGIN BLOCK*, or *DEFINE FUNCTION* statement within the appropriate structure.
3. A *local preamble structure* is delimited by the first statement which is not a *DECLARE* or *IDENTIFY* statement.
4. Any *label* identified within a *local preamble structure* is local to that structure and may be referenced from any lower structure nested within that structure. If an identical *label* is established within the *local preamble structure* of a lower level structure that label then supersedes the higher level definition until the structure in which it is established is exited.
5. A *declare statement* within a *local preamble structure* is always local and consequently may not specify either a *GLOBAL* or *EXTERNAL* attribute.

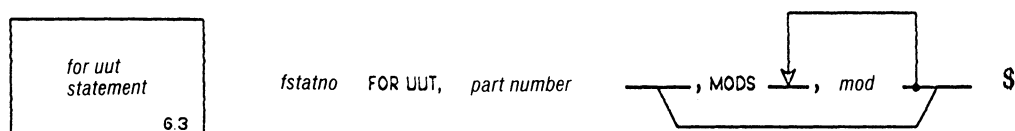
## 6.3 for uut statement

### 6.3.1 Function

FOR UUT is used to indicate the part number and modification states of those UUTs which can be tested by an *atlas specification structure*.

### 6.3.2 Formal Syntax

### 6.3.3 Syntax Diagram



### 6.3.4 Rules

1. FOR UUT may only be written following a BEGIN, ATLAS PROGRAM statement, a BEGIN, ATLAS MODULE statement or another FOR UUT statement.
2. FOR UUT creates a series of Boolean variables known as *mod* variables, for use within conditional GO TO statements.
3. *part number* and *mod* variables established by FOR UUT statements within a *program preamble structure* have the GLOBAL attribute.
4. If a *part number* or *mod* variable is referenced from within an *atlas module structure* the *module preamble structure* must introduce the variables in a FOR UUT statement identical to that in the *program preamble structure* and thereby effectively giving them an implicit EXTERNAL attribute.

### 6.3.5 Notes and Examples

FOR UUT may just be used by a man to check that the software is valid for his UUT. However in most automatic systems it is expected that the operator of the ATE would be required to input the type number of the UUT and details of the incorporated modifications at this stage so that the ATE could sort out its own routing through the ATLAS program by assessing the state of the associated Boolean variables. In this case the variables created by the FOR UUT statements would be set FALSE until the corresponding information from the UUT Modification Record was input by the operator when they would be set TRUE until the end of the ATLAS program.

Although the FOR UUT statement is optional if only one modification state of only one UUT is to be tested by the ATLAS program, it is still recommended that the statement appear since it gives in itself a check that the correct test program for the particular hardware has been selected.

FOR UUT examples are given in 14.18, *mod expression*.

## 6.4 declare statement

### 6.4.1 Function

To establish, label, and identify specific storage spaces used in an *atlas test specification structure* and to establish the type of data to be assigned to each space.

The statement may be used with two major label types, *store* and *list*. Each statement may contain any number of *label* elements that have the same type, size, and format.

### 6.4.2 Formal Syntax