

IEEE Standard for Test Equipment Description Language (TEDL)

Sponsor

**The TEDL Subcommittee
of
Standards Coordinating Committee 20**

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Abstract: A language useful for describing Automatic Test Equipment (ATE) instrumentation and configurations, as well as Interface Test Adapters (ITA), is defined. Principally intended for testing environments using the ATLAS test language, TEDL can also be used to describe instrumentation in non-ATLAS environments.

Keywords: adaptation model, ATE, Automatic Test Equipment, ATLAS, configuration model, device model, TEDL, Test Equipment Description Language

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Introduction

[This introduction is not a part of IEEE Std 993-1997, IEEE Standard for Test Equipment Description Language (TEDL).]

The purpose of the Test Equipment Description Language (TEDL) is to provide a means of producing a standardized description of the equipment on which Automatic Test Equipment (ATE) independent test programs [such as Abbreviated Test Language for All Systems (ATLAS) and A Broad-Based Environment for Test (ABBET™) programs] are to be implemented. This makes visible the underlying decisions affecting the actual implementation and performance of the ATE independent test program, thereby improving the ability to transport test programs from one ATE to another.

The implementation of ATLAS test programs on ATE has traditionally been a difficult process. ATE-specific constraints such as Input/Output pins, interfacing circuitry, system level accuracies, device capabilities, and timing, are imposed by the unique software implementations of each ATE integrator/developer. Therefore, it has been virtually impossible to move an ATLAS test program from one ATE to another with any assurance of compatible or similar results.

The ATLAS language was created with the goal of being “test equipment independent,” with the intentions of being able to generate a test program once, being able to use it on a variety of test equipment; and to have a usable standard industry test language. Since IEEE Std 1226.2-1993, IEEE ABBET™ Trial-Use Standard for Ada-Based ATLAS-Level Test Procedure Interface for A Broad-Based Environment for Test (ABBET™) is based on ATLAS, it also has this “test equipment independent” goal. Therefore, subsequent references to ATLAS shall be understood to refer to ABBET as well.

The unit under test (UUT) orientation of ATLAS test programs has left many implementation problems open to resolution by each ATE integrator/developer. As a result, the implemented ATLAS language semantics have become confused and the meaning of the language has become ambiguous. This ambiguity has restricted the ATLAS portability. Further, these implementation decisions have typically been buried in the proprietary software of each integrator and hence cannot be corroborated by ATLAS test program developers.

TEDL does not attempt to specify the underlying software system that supports and controls the ATE. This innovative process is left to the ATE integrator/developer. TEDL standardizes the human-readable language used to describe the ATE and test program adapters.

Although anyone involved in automated instrumentation may benefit from the material contained in this document, this standard is specifically intended for:

- a) ATE integrators/developers using ATLAS, namely:
 - 1) IEEE Std 716-1995, IEEE Standard Test Language for All Systems—Common Abbreviated Test Language for All Systems (C/ATLAS)
 - 2) ARINC Specification 626-3-1995, Standard ATLAS Language for Modular Test
- b) ATLAS/ABBET Test Program Set developers
- c) System software suppliers
- d) ATE integrators/developers using ABBET, i.e., IEEE Std 1226.2-1993, IEEE ABBET™ Trial-Use Standard for Ada-Based ATLAS-Level Test Procedure Interface for A Broad-Based Environment for Test (ABBET™).

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IEEE Standard for Test Equipment Description Language (TEDL)

1. Overview

1.1 Scope

This standard is intended to apply principally to Automatic Test Equipment (ATE) applications using Abbreviated Test Language for All Systems (ATLAS) test programs. The standard may also apply to ATE applications using non-ATLAS test programs.

1.2 Purpose

The purpose of this standard is to provide a definition of a Test Equipment Description Language (TEDL). The definition consists of syntax and semantic rules for the language together with examples of its use.

1.3 Application

A TEDL model is a mechanism for describing the configuration and capability of a specific ATE (and adapter) and for facilitating the implementation of unit under test (UUT) orientated test programs on the ATE. Specifically it describes:

- a) The devices included in an ATE and the devices included in an adapter.
- b) How these devices are interconnected within the ATE and within the adapter.
- c) What interfaces exist between the test station controller and the devices as well as between the devices and an external connection.
- d) The capabilities of the ATE devices and how these devices are programmed to provide the desired test functions.

TEDL is not intended to be a programming language. It is intended that it be used to establish a data structure representing the ATE and adapter. Some of its data elements may be dynamic, requiring processing as the state of the system changes.

The TEDL model fills the information gap between the ATLAS test program and the physical instrumentation.

Compliance to this standard does not remove user responsibility for system compatibility at either the application or physical communication level. Although it is the intent of this standard to simplify the system integration, the user must be familiar with the characteristics of all the system components in order to configure an optimum ATE.

1.4 Relationship to other documents

- a) *IEEE Std 716-1995 and ARINC Specification 626-3-1995*. The companion standards IEEE Std 716-1995 and ARINC Specification 626-3-1995 define the ATLAS test language that is used to write ATLAS test programs. TEDL provides all test system information necessary to perform automatic and manual resource allocation for ATLAS test programs.
- b) *Test resource control standards*. A test resource control standard defines the physical, electrical, and logical aspects of the control interface between the test station controller and an instrument. The following control interfaces are supported by TEDL and are described in 3.3:
 - 488.1
 - 488.2
 - Ethernet
 - RS-232
 - VXI
- c) *IEEE Std 1226.2-1993*. This standard specifies Ada packages that define general purpose test support services and data types needed to complete the definition and implementation/application of the other **IEEE ABBET** component standards.

2. References

This standard shall be used in conjunction with the following publications. When the following standards are superseded by an approved revision, the revision will be considered for incorporation into this standard.

ARINC Specification 626-3-1995, Standard ATLAS Language for Modular Test.¹

EIA/TIA-232-E, Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange.^{2,3}

IEEE Std 100-1996, The IEEE Standard Dictionary of Electrical and Electronics Terms (ANSI).⁴

IEEE Std 488.1-1987 (Reaff 1994), IEEE Standard Digital Interface for Programmable Instrumentation (ANSI).

IEEE Std 488.2-1992, IEEE Standard Codes, Formats, Protocols, and Common Commands for Use with IEEE Std 488.1-1987, IEEE Standard Digital Interface for Programmable Instrumentation (ANSI).

IEEE Std 716-1995, IEEE Standard Test Language for All Systems—Common Abbreviated Test Language for All Systems (C/ATLAS).

IEEE Std 771-1989, IEEE Guide to the Use of the ATLAS Specification (ANSI).⁵

IEEE Std 1155-1992, IEEE Standard VMEbus Extensions for Instrumentation: VXIbus (ANSI).

IEEE Std 1226-1993, IEEE ABBETTM Trial-Use Standard for A Broad-Based Environment for Test (ABBETTM) Overview and Architecture.

¹ARINC publications are available from ARINC Research Corporation, Document Section, 2551 Riva Rd., Annapolis, MD 21401.

²EIA publications are available from Global Engineering, 1990 M Street NW, Suite 400, Washington, DC, 20036, USA.

³This standard is commonly known as RS-232.

⁴IEEE publications are available from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA.

⁵IEEE Std 771-1989 has been withdrawn; however, copies can be obtained from Global Engineering, 15 Inverness Way East, Englewood, CO 80112-5704, USA, tel. (303) 792-2181.

IEEE Std 1226.2-1993, IEEE ABBET™ Trial-Use Standard for Ada-Based ATLAS-Level Test Procedure Interface for A Broad-Based Environment for Test (ABBET™).

ISO/IEC 8802-3: 1996 Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements—Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications (ANSI).⁶

3. Terminology

3.1 Definitions

3.1.1 Abbreviated Test Language for All Systems (ATLAS): A standard abbreviated English language used in the preparation and documentation of test procedures, or test programs, that can be implemented either manually or with automatic or semiautomatic test equipment.

3.1.2 A Broad-Based Environment for Test (ABBET): A set of international standards that define language independent interfaces to industry standards regarding automatic testing and integrated diagnostics.

3.1.3 adapter: A device, or series of devices, designed to provide a compatible connection between the unit under test (UUT) and the test equipment. May include proper stimuli or loads not contained in the test equipment.

3.1.4 Automatic Test Equipment (ATE): Equipment that is designed to conduct analysis of functional or static parameters to evaluate the degree of performance degradation and may be designed to perform fault isolation of unit malfunctions. The decision-making, control, or evaluative functions are conducted with minimum reliance on human intervention.

3.1.5 bus address: A label used to define a communications path to a device in a bus environment where multiple devices share a common data path.

3.1.6 control interface: The interface to a device through which the operation and response of the device is controlled either by manual operation or by a system controller.

3.1.7 device: Any independent test resource. A test resource may be either manually or automatically controlled. Devices can generate stimuli, measure response, or provide switching control. Examples include voltmeters, counters, and power supplies.

3.1.8 device port: The physical connection points through which signals flow into or out of a device or where timing, synchronization, and triggering control are accomplished.

3.1.9 signal interface: The interface between a test device and the unit under test (UUT) through which signals pass. Stimuli pass from the test device to the UUT. Measured signals generally pass from the UUT to a test device.

3.1.10 system integrator: A person who combines software and hardware into a working ATE.

3.1.11 test program: A test program implements the tests, test methods, and test sequences to be performed on a unit under test (UUT) to verify conformance with its test specification with or without fault diagnosis and designed for execution on a specific test system.

⁶ISO/IEC publications are available from the ISO Central Secretariat, Case Postale 56, 1 rue de Varembé, CH-1211, Genève 20, Switzerland/Suisse. ISO publications are also available in the United States from the Sales Department, American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036, USA.

3.1.12 test program set: The complete set of hardware, software, and documentation needed to evaluate a unit under test (UUT) on a given test system. The test program set includes the test program, adapter devices, ancillary hardware and software, operator initiated procedures, and supporting documentation (source data, adapter device schematics, parts lists, etc.).

3.1.13 test requirements: A specification of a particular test action giving the necessary power input conditioning, the stimulus and load applications, the measurements to be taken, and any special operator actions. The complete collection of all test requirements defines the actions necessary to validate proper operation of a unit under test (UUT) in accordance with a predetermined design or product specification.

3.1.14 unit under test (UUT): The entity to be tested. It may range from a simple component to a complete system.

3.2 Acronyms

ABBET	A Broad-Based Environment for Test
AM	adaptation model
AML	adaptation model language
ANSI	American National Standards Institute
ARINC	Aeronautical Radio Incorporated
ATE	Automatic Test Equipment
ATLAS	Abbreviated Test Language for All Systems
CM	configuration model
CML	configuration model language
DM	device model
DML	device model language
EIA	Electronics Industries Association
FSD	formal syntax definition
TEDL	Test Equipment Description Language
UUT	unit under test
VXI	VMEbus Extensions for Instrumentation

3.3 TEDL reserved words

3.3.1 Rules for writing TEDL reserved words

The following rules apply to the writing of TEDL reserved words in a test equipment description, to correspond to their equivalent formal syntax definition (FSD) literal tokens:

- If there are no spaces within a FSD literal token, no spaces can be included in the equivalent TEDL reserved word in a test equipment description.
- If there are spaces within a FSD literal token, one or more spaces can be included in the equivalent TEDL reserved word in a test equipment description.
- If there are two adjacent FSD literal tokens, one or more spaces shall be included between the two TEDL reserved words.

3.3.2 Definition of TEDL reserved words

3.3.2.1 1-WIRE: Used in <function stmt> to specify that each relay in a switch module controls the signal flow through one wire.

3.3.2.2 2-WIRE: Used in <function stmt> to specify that each relay in a switch module controls the signal flow through two wires.

3.3.2.3 3-WIRE: Used in <function stmt> to specify that each relay in a switch module controls the signal flow through three wires.

3.3.2.4 4-WIRE: Used in <function stmt> to specify that each relay in a switch module controls the signal flow through four wires.

3.3.2.5 ADAPTATION_MODEL: Used in <adaptation model header> to define a logical model for describing the interconnection between the test station, adapter devices and the UUT pins.

3.3.2.6 ADDRESS: Identifies the bus address of a device linked to the test station controller. Used in <control interface> with the following bus identifier reserved words: RS232, IEEE_488.1, IEEE_488.2, ETHERNET, VXI and GPIB.

3.3.2.7 ALL: Used in <uut identification> when all UUT versions are applicable.

3.3.2.8 AND: Used in <ifthen block> to allow multiple conditions to apply.

3.3.2.9 APPLIED: Used in <control block> to describe the current state of the device. The APPLIED state is only used with sources and loads. It indicates that the signal has achieved its required active state.

3.3.2.10 ARMED: Used in <control block> to describe the current state of the device. The ARMED state is only used with sensors. It indicates that the sensor is ready to take a measurement but its associated event detectors, if any are required to take the measurement, are disabled so the measurement will await them.

3.3.2.11 ASSIGN: Used in <composite device identification> to assign device port names to the composite device port names.

3.3.2.12 AT: Used in device model to identify the device port(s) at which a capability exists.

3.3.2.13 ATE: Used in <ate identification> to identify which ATE configuration model is to be used.

3.3.2.14 BY: Defines the increment of change in a range of values in a <signal characteristics> field.

3.3.2.15 CAPABILITY: Identifies the <capability block> of a device model, which establishes a correspondence between ATLAS requirements and device capabilities.

3.3.2.16 COMMON: A conducting body used as a common return for an electrical circuit and as an arbitrary zero potential.

3.3.2.17 COMPOSITE_DEVICE: A combination of multiple devices interconnected to provide a functional test requirement.

3.3.2.18 CONFIGURATION_MODEL: A logical model that provides the linkage between the device models and the adaptation models.

3.3.2.19 CONNECT_ALGORITHM: A formula that derives switch commands from switch device descriptive information.

3.3.2.20 CONNECT_PORT: The initial element in a switch control definition statement that identifies control codes associated with switch port pairs.

3.3.2.21 CONNECTED: Used in <control block> to describe the current state of the device. The CONNECTED state indicates that the resource has been connected to particular UUT pins for subsequent interaction.

3.3.2.22 CONNECTIONS: Used in <extend> to identify an additional pin descriptor associated with a device port, in addition to the ATLAS list of pin descriptors.

3.3.2.23 CONNECTS: Describes adapter paths and interconnections or device paths and interconnection.

3.3.2.24 CONTROL: Used in device model FUNCTION statements to introduce the <control block> that defines device control codes.

3.3.2.25 CONTROL_INTERFACE: Identifies the <control interface> field of a <device identification> which defines the buses linking devices to a test system controller.

3.3.2.26 DELAY: Used in <control interface> to specify the time between transmitting characters to or receiving characters from the GPIB interface.

3.3.2.27 DEVICE: Used in path or segment definition statements to identify device connection points in the path or segment.

3.3.2.28 DEVICE_MODEL: A logical model associated with each type of device used in a test system that provides the necessary information for comparing device capabilities to UUT requirements, and provides the control codes necessary to control these capabilities.

3.3.2.29 DIGITAL_TEST: Identifies the digital function type in a device model (along with the STIM, RESP, and STIM_RESP reserved words).

3.3.2.30 DIMENSION: Used in <extend> to identify an additional unit of dimension in addition to the authorized dimensional units listed in IEEE Std 716-1995 or ARINC Specification 626-3-1995 (ATLAS implementations) or in IEEE Std 1226.2-1993 (ABBET implementations).

3.3.2.31 DISCONNECT_CHANGE: Introduces a switch control statement that defines the mnemonic change that converts a switch connect command to a switch disconnect command. For example, if the connect command is <CLOSE R7 R8>, the disconnect change statement could be DISCONNECT_CHANGE “CLOSE” TO “OPEN”.

3.3.2.32 EARTH: The earth ground electrical reference.

3.3.2.33 ELSE_IF: Part of an <ifthen block> that introduces another branch.

3.3.2.34 END: Used to end all model structures and the <ifthen block> structure.

3.3.2.35 EQ: The equality evaluation operator.

3.3.2.36 ERRLMT: The specified accuracy of a signal characteristic in a device model.

3.3.2.37 ETHERNET: Used in <control interface> to select the ISO/IEC Std 8802-3: 1996 control interface.

- 3.3.2.38 EVENT_MONITOR:** Identifies the event monitor function type in a device model.
- 3.3.2.39 EVENT_PORT:** Used in a <condition> field to name the ATE or device port that admits the event.
- 3.3.2.40 EVENT_SLOPE_NEG:** Used in an <ifthen block> to specify the condition that the event slope is negative.
- 3.3.2.41 EVENT_SLOPE_POS:** Used in an <ifthen block> to specify the condition that the event slope is positive.
- 3.3.2.42 EVENT_VOLTAGE_EQ:** Used in an <ifthen block> to specify the voltage of the event is equal to a particular value.
- 3.3.2.43 EXTEND:** Used in a device model to identify additional signal characteristics or device characteristics that are not contained in IEEE Std 716-1995 or ARINC Specification 626-3-1995.
- 3.3.2.44 FUNCTION:** Identifies the functionality of a device in a device model.
- 3.3.2.45 GANG:** Used in <function stmt> to identify ganged switching in the switch module.
- 3.3.2.46 GE:** The greater than or equal evaluation operator.
- 3.3.2.47 GPIB:** Used in <control interface> to select the GPIB control interface.
- 3.3.2.48 GT:** The greater than evaluation operator.
- 3.3.2.49 IEEE_488.1:** Used in <control interface> to select the IEEE Std 488.1-1987 control interface.
- 3.3.2.50 IEEE_488.2:** Used in <control interface> to select the IEEE Std 488.2-1992 control interface.
- 3.3.2.51 IF:** Introduces an <ifthen stmt> and closes an <endif stmt>.
- 3.3.2.52 IF_ERROR:** Used in device model <control sequence> to provide the capability to specify the error response of a device for a specific command.
- 3.3.2.53 INTERFACE_CONNECTOR:** Interface connector(s) on the front panel of the ATE.
- 3.3.2.54 IS:** Used in various statements as an entry delimiter.
- 3.3.2.55 LE:** The less than or equal evaluation operator.
- 3.3.2.56 LIMIT:** Used in <function stmt> to actively restrict the device to the range of values specified.
- 3.3.2.57 LOAD:** Identifies the load function type in a device model.
- 3.3.2.58 LT:** The less than evaluation operator.
- 3.3.2.59 MATRIX:** Used in <function stmt> to identify matrix switching in the switch module.
- 3.3.2.60 MAX:** Used in <function stmt> to identify a maximum value of the specified characteristic.
- 3.3.2.61 MEASURED:** Used in <control block> to describe the current state of the device. The MEASURED state is only used with sensor statements. The MEASURED state indicates that the instrument has taken its measurement which is available to be collected.

3.3.2.62 MESSAGE_BASED: Used in <control interface> to identify a device that is controlled by message based commands.

3.3.2.63 MIN: Used in <function stmt> to identify a minimum value of the specified characteristic.

3.3.2.64 MODIFIER: Used in <extend> to identify an additional device characteristic in addition to the authorized noun modifiers listed in IEEE Std 716-1995 or ARINC Specification 626-3-1995 (ATLAS implementations) or in IEEE Std 1226.2-1993 (ABBET implementations).

3.3.2.65 MULTIPLEX: Used in <function stmt> to identify multiplex switching in the switch module.

3.3.2.66 NE: The Not Equal evaluation operator.

3.3.2.67 NEED_DEVICE: Identifies the devices used to form a composite device.

3.3.2.68 NEED_PATH: Identifies the connection paths necessary to interconnect the components of a composite device.

3.3.2.69 NEG_SLOPE: Used in characteristics statements to specify synchronization signal slope.

3.3.2.70 NONE: Used in <control interface> to identify that the selected device does not have a control interface, e.g., fixed power supply.

3.3.2.71 NOUN: Used in <extend> to identify an additional noun in addition to the authorized nouns listed in IEEE Std 716-1995 or ARINC Specification 626-3-1995 (ATLAS implementations) or in IEEE Std 1226.2-1993 (ABBET implementations). Also used in <function stmt> to identify device capabilities.

3.3.2.72 OR: Used in <ifthen block> to allow one of a number of conditions to be applied.

3.3.2.73 PATH: A statement that defines a series of connection points that comprise a test path and the characteristics of that path.

3.3.2.74 PORT: An input or output connection point or terminal on a device or UUT.

3.3.2.75 PORT_ALIASES: Introduces a series of statements that correlate virtual device port names with real ATE device port names.

3.3.2.76 POS_SLOPE: Used in characteristics statements to specify synchronization signal slope.

3.3.2.77 PREP: Used to introduce the <resource preparation capability> structure which is a standardized method of identifying device capabilities which can not be defined at the ATLAS level.

3.3.2.78 PREPARED: Used in <control block> to describe the current state of the device. The PREPARED state indicates that the device is ready to interact with the UUT. However, if the resource requires any form of synchronization to interact with the UUT, it is prepared for these transitions.

3.3.2.79 RANGE: Used in device models in specifying a range of decimal values for a signal characteristic.

3.3.2.80 READY: Used in <control block> to describe the current state of the device. The READY state indicates that the device is waiting for any events that are required either to cause a source device to change from quiescent to active or a sensor device to take its measurement.

3.3.2.81 REGISTER_BASED: Used in <control interface> to identify a device that is controlled by register based commands.

3.3.2.82 RESP: Used in <function stmt> to identify “response only” characteristics of a digital device.

3.3.2.83 RS232: Used in <control interface> to select the EIA/TIA-232-E control interface.

3.3.2.84 SEC: Used in <control interface> to identify that the preceding number is in seconds.

3.3.2.85 SENSOR: Identifies the sensor function type in a device model.

3.3.2.86 SET: Used in <control block> to describe the current state of the device. The SET state indicates that the device has been set so that it will operate at the required signal level.

3.3.2.87 SETUP_RESOURCE: Used to introduce the <resource preparation control> structure that is a standardized method of defining control codes for device capabilities which can not be defined at the ATLAS level.

3.3.2.88 SIG_CHAR: Used in the device model FUNCTION statement to introduce the <signal characteristics> field.

3.3.2.89 SOURCE: Identifies the Source function type in a device model.

3.3.2.90 SPST: Used in <function stmt> to identify a switch module as having single pole, single throw relays.

3.3.2.91 STATE: Used in a <condition> field to designate the state of an entity.

3.3.2.92 STIM: Used in <function stmt> to identify “stim only” characteristics of a digital device.

3.3.2.93 STIM_RESP: Used in <function stmt> to identify “stim” and “response” characteristics of a digital device.

3.3.2.94 SWITCH: Identifies the switch function type in a device model (along with the MATRIX, GANG, MULTIPLEX, SPST, 1_WIRE, 2_WIRE, 3_WIRE, and 4_WIRE reserved words).

3.3.2.95 SYNC: Used in <function stmt> to identify that the selected device has synchronizing capability.

3.3.2.96 SYNC_BIT_TRANSITION: Used in <function stmt> to identify that the selected device has synchronization capability on a bit transition for digital data.

3.3.2.97 SYNC_WORD_TRANSITION: Used in <function stmt> to identify that the selected device has synchronization capability on a word transition for digital data.

3.3.2.98 TEST_PATHS: Introduces a series of statements that define all test paths needed to test a UUT.

3.3.2.99 THEN: Part of an <ifthen stmt> or <elseif then stmt> to close the statement.

3.3.2.100 TIME_OUT: Instrument bus time allowed for action.

3.3.2.101 TIMER: Used in <function stmt> to identify that the selected device is a timer device.

3.3.2.102 TO: Used in path or segment definition statements to delimit connection point entries.

3.3.2.103 TO_PORT: The second element in a switch control definition statement that identifies control codes associated with switch port pairs.

3.3.2.104 UNALLOCATED: Used in <control block> to describe the current state of the device. The UNALLOCATED state indicates that the device is not committed to any particular UUT function and is in a quiescent state available for use.

3.3.2.105 USING: Identifies the device model used in device identification statements.

3.3.2.106 UUT: Used in <uut identification> to identify the name of the UUT associated with the adaptation model.

3.3.2.107 UUT_CONNECTOR: Part of a <define path> that specifies the name of a <connection port name>.

3.3.2.108 VERSION: Provides a version identifier in TEDL models.

3.3.2.109 VXI1.2: Used in <control interface > to select the VXI1.2 control interface.

3.3.2.110 VXI1.3: Used in <control interface > to select the VXI1.3 control interface.

3.3.2.111 VXI1.4: Used in <control interface > to select the VXI1.4 control interface.

4. TEDL overview

4.1 TEDL objectives

The objectives of TEDL are to:

- a) Provide a standard interface between ATLAS test programs and test systems. A test system includes:
 - 1) Individual devices including source, sensor, load, transformation and routing
 - 2) Complete test station configurations
 - 3) UUT adapters
 - 4) ATLAS and ATE interfaces
 - 5) System software used to monitor and control the ATE
- b) Provide all test system information necessary to perform automatic and manual resource allocation for ATLAS test programs.
- c) Use applicable information from related IEEE standards.
- d) Incorporate an extensibility mechanism to enable it to cover the ATLAS language extensions that are specific to a restricted test discipline.
- e) Assume no particular control interface or ATE architecture.
- f) Be modular so that a test system component can have the same TEDL description regardless of the test station configuration in which it is used.

4.2 TEDL description

4.2.1 General description

TEDL is a standard language for describing test equipment. It is intended to be used by ATE integrators/developers and ATLAS test program designers for describing ATE and adapters. The test equipment descriptions contain all the information necessary for the ATE test resources and the test adapter to provide the signals required by the ATLAS test program. These descriptions are intended to be both human and machine readable.

TEDL specifically targets the ATLAS language, which is a high order language for describing test procedures. The ATLAS language is orientated to signals and events that take place at the UUT connection interface. ATLAS test programs are therefore independent of the ATE hardware. The ATE test resources supply the necessary signals and event recognizers in accordance with the requirement of the ATLAS test program in order to satisfy the test specification for the UUT.

Each implementation of ATLAS on a particular ATE requires the existence of a software system to process the ATLAS test programs and control the ATE. In order for the software system to properly carry out these functions, it shall have a model of the ATE and the adaptation hardware (adapter).

4.2.1.1 ATE description

The description of the ATE is typically the responsibility of the ATE integrator/developer. This description includes:

- a) Modeling of the capabilities of test resources and their interconnections
- b) Defining the test resource control interfaces

4.2.1.2 Adapter description

The description of the adapter hardware is typically the responsibility of the ATLAS test program designer (often working with the ATE integrator/developer). This description includes:

- a) A definition of all interconnections through the adapter
- b) A definition of all active and passive devices in the adapter

4.2.2 TEDL models

TEDL consists of a layered series of three models that fully describe the linkage between the instrumentation of the ATE and the UUT, namely the adaptation model (AM), the configuration model (CM), and the device model (DM). These three layered models provide standardization and facilitate the implementation of ATLAS test programs in actual hardware. Figure 1 illustrates the relationship between the TEDL models.

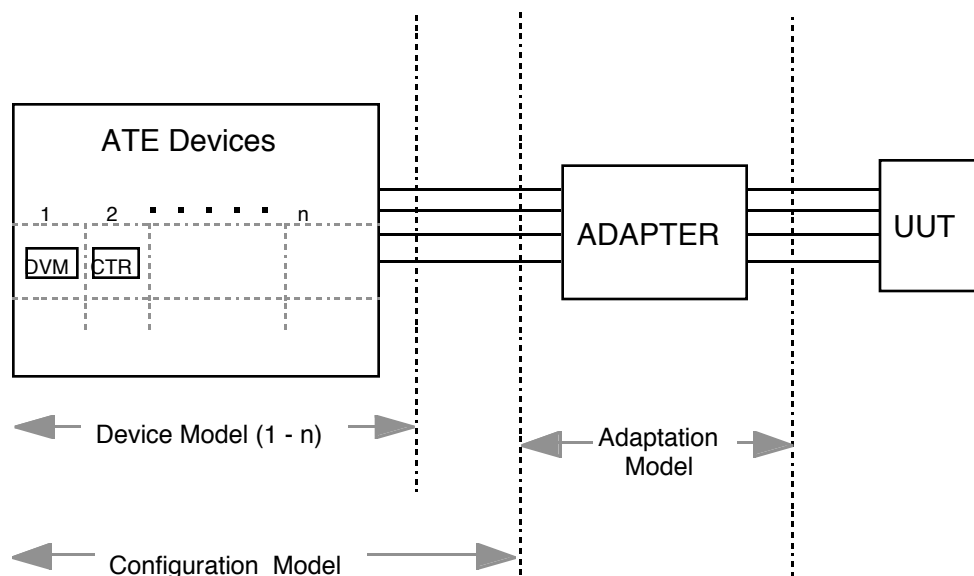


Figure 1—Relationship between TEDL models

A requirement of each layer is to map the terms and conditions of the upper boundary of a model to the terms and conditions of the lower boundary. This mapping is necessary to interpret the meaning of high level statements into lower level statements. The mapping is dependent on the ATE and its environment. It is developed by the ATE integrator/developer and distributed throughout the layers by model semantics. Model semantics provide the meaning of any ATE description requirement, and may transcend more than one layer. Model semantics are defined in Clauses 6 through 8 of this standard.

This standard does not impose a specific implementation architecture. Figures 2 and 3 illustrate possible architectures.

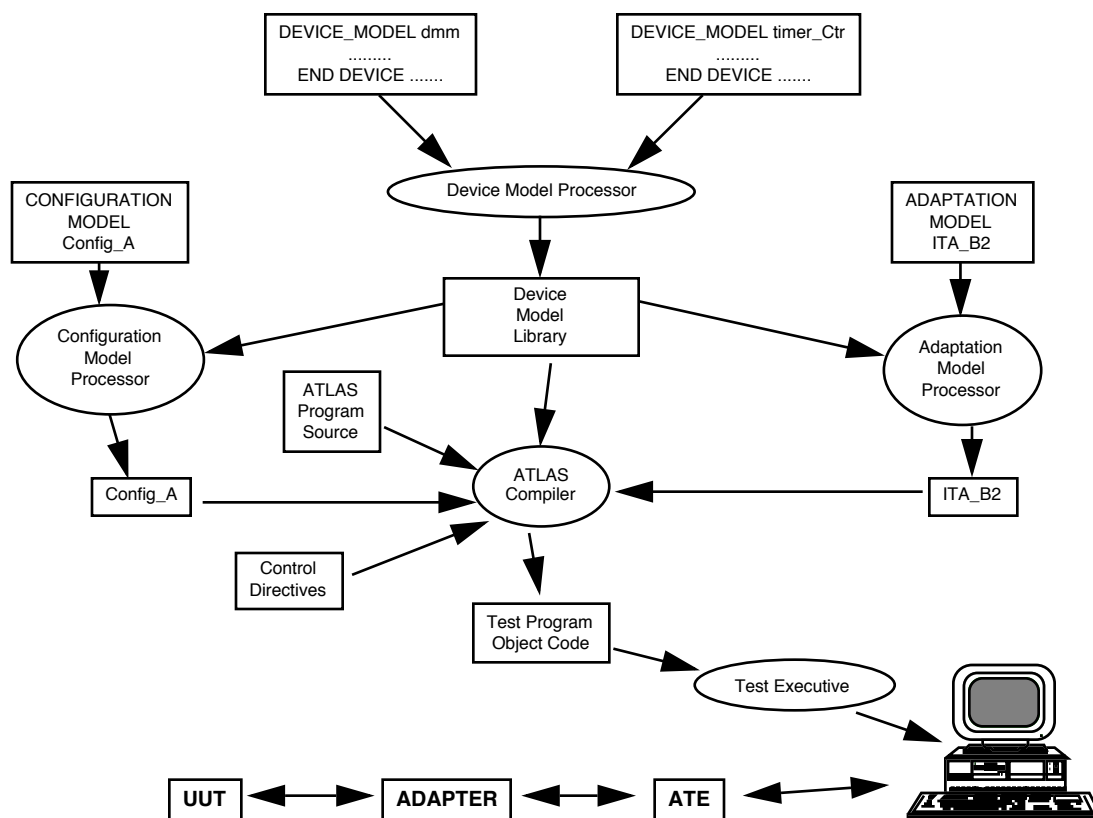


Figure 2—Architectural example of TEDL using ATLAS

4.2.2.1 The adaptation model (AM)

The AM is the logical model for describing the interconnection between the ATE interface, the adapter devices (if any), and the UUT interface. The AM is the layer that links the software model of the ATE configuration to the ATLAS test program. Typically, one AM is necessary for each ATLAS test program executed on an ATE. Figure 4 illustrates the components described by an AM. The AM is described by the adaptation model language (AML) defined in Clause 6 of this standard.

4.2.2.2 The configuration model (CM)

The CM is the logical model for identifying the elements of an ATE, as well as describing their interconnection and intercommunication in the test environment. One CM is associated with each ATE. Figure 5 shows the components described by a CM. The CM is described by the configuration model language (CML) defined in Clause 7 of this standard.

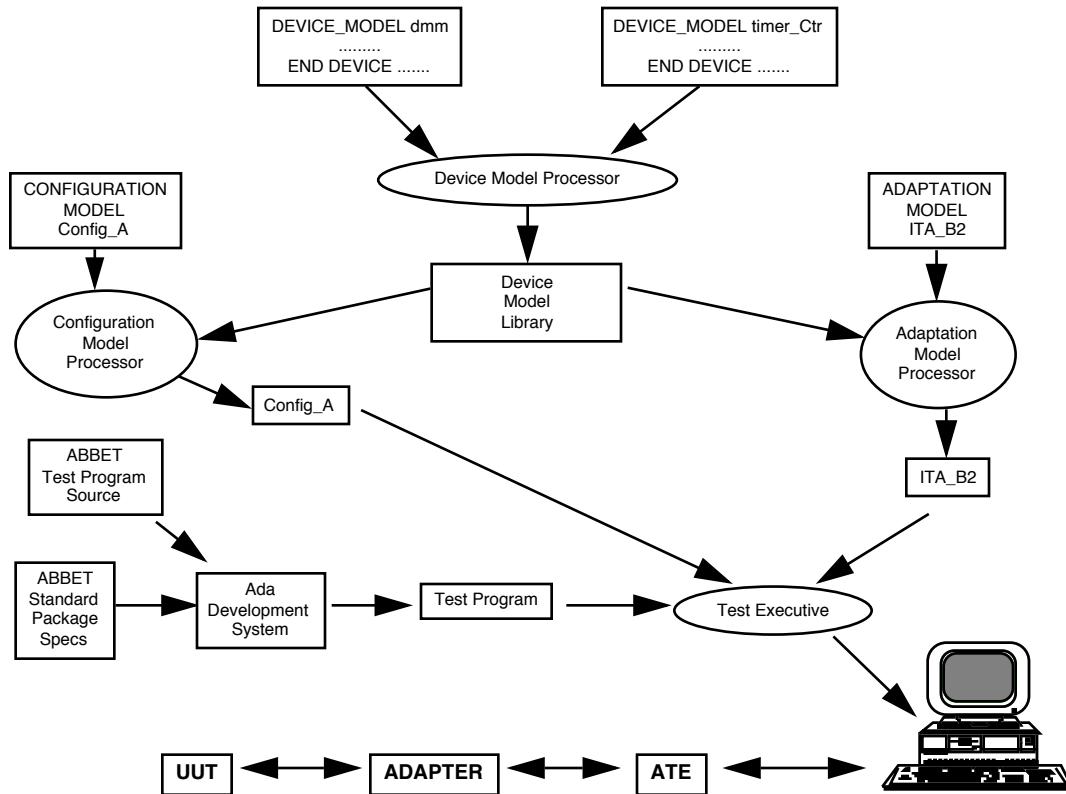


Figure 3—Architectural example of TEDL using ABBET

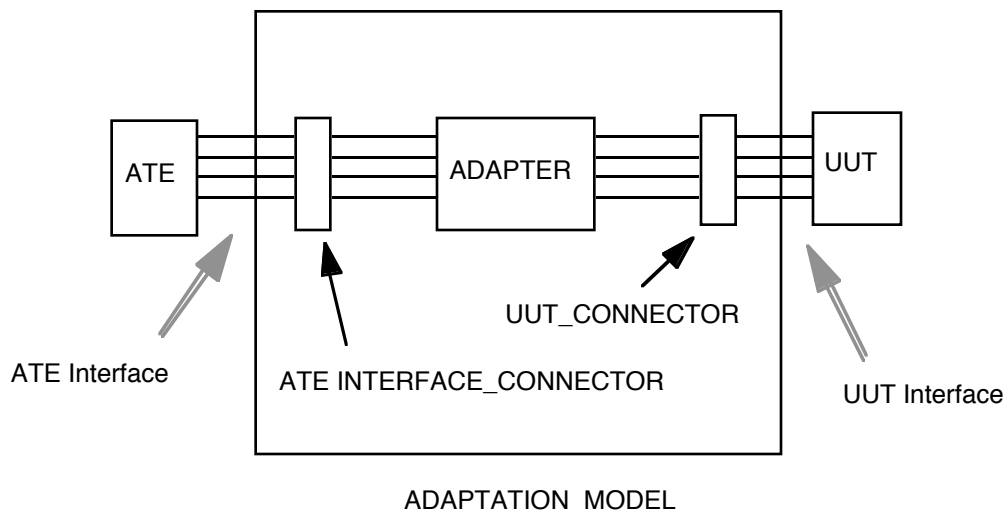


Figure 4—TEDL adaptation model

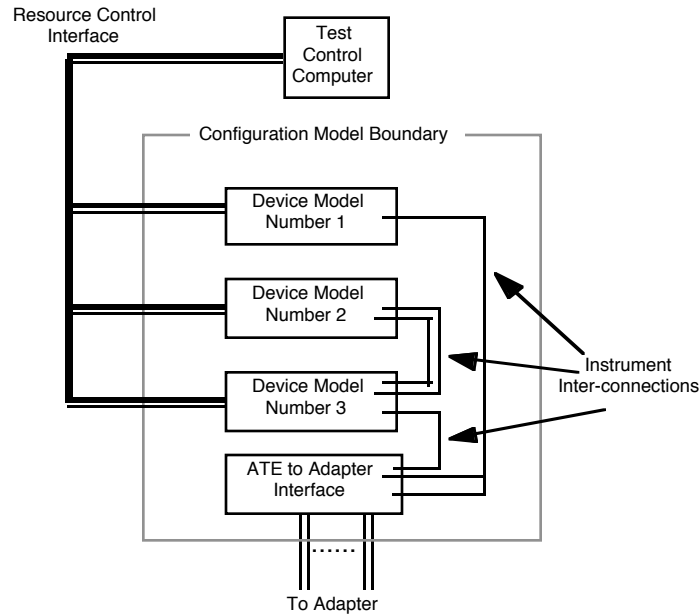


Figure 5—TEDL Configuration model

4.2.2.3 The device model (DM)

The primary purpose of the DM is to provide a description of the capabilities of the ATE and adapter devices and to define how these devices are controlled. DMs are logical models that describe devices associated with an ATE. A device may be:

- a) A physical device (e.g., a voltmeter)
- b) Part of a physical device (e.g., only the voltage measuring capability of a multimeter)
- c) The combination of multiple physical devices (e.g., a device that synthesizes frequency modulated signals using two function generators)
- d) A software process that accomplishes a function requested by ATLAS test programs (e.g., timing measurements)
- e) A combination of software algorithms and any of the above

One DM is necessary for each different device associated with an ATE. A DM is created using the device model language (DML) described in Clause 8 of this standard.

4.2.3 Comment statements in TEDL models

Comment statements may appear between any two statements in the AM, CM, and DM as well as between the models.

Example

```
/* This is an example of a comment statement. Notice that everything between the
begin and end symbols is included. */
```

5. Interface to the ATLAS test program

5.1 Introduction

One of the key purposes of a TEDL model is to provide the interface between the ATLAS test program and the physical devices in the ATE. To do this, the TEDL model establishes specific interfaces with the ATLAS elements that make up the test program. These interfaces include common TEDL model and test program vocabulary references, and specific correspondences between ATLAS elements and TEDL models.

5.2 ATLAS-to-TEDL correspondence

This correspondence between the individual TEDL models (AM, CM, DM) and the ATLAS elements is critical to achieve the objectives of the TEDL architecture.

5.3 Extensibility

It is not the intent of this standard to comprehensively identify all possible combinations of ATLAS constructs, inclusive of the extensibility capability, and its corresponding TEDL modeling. As defined in IEEE Std 716-1995 or ARINC Specification 626-3-1995, the extensibility capability has been added solely for the purpose of responding to unique test scenarios. To this end, TEDL must be flexible enough to adjust to these new ATLAS constructs.

5.4 Examples

Specific examples of the correspondences between ATLAS elements and TEDL models are given in 5.4.1 through 5.4.5. Tables 1 through 5 identify which ATLAS elements relate to the specific TEDL model.

5.4.1 REQUIRE Example

The following is an example of an ATLAS REQUIRE statement and the corresponding TEDL models that bear a relationship to the ATLAS elements:

```
REQUIRE, 'PPS', SOURCE, DC SIGNAL,
CONTROL,
    VOLTAGE RANGE 0 V TO 10 V BY 0.1 V,
CAPABILITY,
    CURRENT RANGE 0 A TO 1 A
CNX HI LO $
```

Table 1—REQUIRE statement relationships

TEDL models	ATLAS elements
Adaptation model	'PPS' CNX HI LO
Configuration model	REQUIRE CNX
Device model	DC SIGNAL SOURCE VOLTAGE RANGE CURRENT RANGE