IEEE Standard for SCADA and Automation Systems

IEEE Power Engineering Society

Sponsored by the
Substations Committee

C37.1™

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IEEE Power Engineering Society

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Abstract: The requirements for SCADA and automation systems in substations are defined. This standard defines the process of substation integration as the design process that is the foundation for substation automation. Functional and environmental requirements are provided for all IEDs located in the system. Tutorial material is included in the annexes to address common issues with systems without introducing requirements. Information is also presented in the annexes regarding SCADA masters.

Keywords: automatic control, data acquisition, IED, Intelligent Electronic Device, SCADA, substation integration, substation automation, supervisory control

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Introduction

This introduction is not part of IEEE Std C37.1-2007, IEEE Standard for SCADA and Automation Systems.

This standard applies to systems used for monitoring, switching, and controlling electric apparatus in unattended or attended stations, generating stations, and power utilization and conversion facilities. It does not apply to equipment designed for the automatic protection of power system apparatus or for switching of communication circuits. The requirements of this standard are in addition to those contained in standards related to the individual devices (e.g., switchgear).

This document is a significant revision of IEEE Std C37.1-1994. This revision reflects current technology that is generally being provided to meet the requirements of utilities. Originally, this standard was a section of ANSI C37.2-1970, which also contained device function numbers. ANSI C37.2-1970 was revised into two standards: IEEE Std C37.1-1979, IEEE Standard Definition, Specification, and Analysis of Manual, Automatic, and Supervisory Station Control and Data Acquisition, and IEEE Std C37.2™-1979, IEEE Electric Power System Device Numbers. Previous editions were approved by the IEEE in 1962, 1956, 1945, and 1937. The original work on this subject was done by the American Institute of Electrical Engineers (now the Institute of Electrical and Electronic Engineers) and published in 1928 as AIEE No 26. The latest revision of the standard on Electrical Power System Device Function Numbers is IEEE Std C37.2-1996 (Reaff 2001) [B11].[a]

This standard applies to rapidly changing technology. It is anticipated that frequent revision may be desirable. This revision was prepared by the Electric Network Control Standards Working Group of the Data Acquisition, Processing, and Control Systems Subcommittee of the IEEE Power Engineering Society Substations Committee. The revision is an attempt to bring the standard up to date and further broaden its applicability with respect to control, supervisory, and telemetry.

IEEE Tutorial Course Text EHO 337-6 PWR referenced in the previous revision of this standard is no longer available from the IEEE service center. In addition, the corresponding Tutorial Video Tape HVO 245-1-POT referenced in the previous revision of this standard has been discontinued by the IEEE. The following special publications and tutorial texts are available from the IEEE service center:

a) IEEE Tutorial “Substation Automation Tutorial” [B17] is recommended for those not familiar with substation automation systems

b) IEEE Tutorial “The Protective Relay IED in the Automation World” [B18]

c) IEEE Tutorial “Adding New Life to Legacy SCADA Systems” [B16]

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1. Overview

1.1 Scope

This standard applies to, and provides the basis for, the definition, specification, performance analysis, and application of SCADA and automation systems in electric substations, including those associated with generating stations and power utilization and conversion facilities.

1.2 Purpose

The purpose of this standard is to provide guidance to the engineer responsible for the design and specification of SCADA and automation systems.

1.3 Use

The designer/specifier may use this standard in the design, procurement, and implementation of all or a portion of a system. This document is a generic standard for SCADA and Automation Systems. The designer/specifier shall select those portions of this document that are applicable to a specific system. This may include the modification of tables and requirements contained herein.

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

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