The Hieroglyphics of Instrumentation - BBB (Borrow)
Control System Documentation by Thomas McAvinew and Raymond Mulley
Reviewed by Nick Sands

Documentation is a big part of an instrumentation and control project. As Ray Mulley and Tom McAvinew point out in the second edition of Control System Documentation, the standard symbols and identification codes developed through ISA are the common language for such projects. Ray Mulley is the past chairman of the SP5.1 committee responsible for the Instrumentation Symbols and Identification standard, with over 30 years of professional experience from start-up engineer to director of design engineering, and over 30 years as an ISA member. Tom McAvinew is the managing director for the SP5 committees, with over 40 years of professional experience, and over 40 years as an ISA member. Tom has held many important positions in ISA and worked for several companies, including his own Instrumentation and Control Engineering LLC. Mulley and McAvinew provide a guided tour of the instrument related symbols, identification methods, and the typical drawings on which these symbols are used.

The first chapters cover an introduction, instrument symbols and identification. Here the authors combine history and helpful hints on the use of the standard instrument and control symbols, the alphanumeric tag number used to identify elements, and the symbols used to depict process equipment. While some larger companies may have developed their own set of symbols and identification code, the authors explain the ISA standard with the insight of years of standard committee experience.

In chapter 5 the authors discuss briefly the nine standard control structures given by E H Bristol in 1981. The authors here show the symbolic depiction of each strategy with some description on the applications. It is an interesting chapter. For those that may not read the book, the structures are; feedback control, feedforward control, decoupling, cascade control, ratio control, load balancing, range extending, redundant loops (including redundant backup, integral take over, and valve position control), and switched control (including auctioneering, selector, and variable structure).

The next chapters focuses on drawings and the details that help make them effective. The engineering diagram, sometimes called a P&ID, shows more equipment detail than the process flow diagram, and usually less information on mass and energy balances. This chapter completes the discussion of most of the ISA symbols from the earlier chapters. The loop sheet narrows the focus of the drawing down to a single loop or device and all the connections and elements involved, providing an excellent document for checkout and troubleshooting. Logic diagrams and sequential function charts are described, along with the functions and rules for each and the ISA standards for logic along with suggestions on clear use of the symbols.

The last sections cover drawings for ladder logic, electrical wiring, single lines, and even some control panel layout drawings. There are many example drawings and many symbols shown, though some without explanation. While control panels are discussed, graphics for visual display units are not.

It is no easy task to write a book on instrument related symbols, but Mulley and McAvinew add explanations and guidance not found in the standards, applying their combined 70+ years of experience and deep involvement in standards development. The symbols and identification chapters are well written, but not quite enough to fill a book, so it stretches to drawings in a less enriching way. Control System Documentation, available from ISA for $66 (member price), is a good guide at a better price than the S5.1 and S5.2 standards but it rates a borrow (BBB) rather than buy.