

Sect.	Who	Comment	Resolution
Gen	Arturo Espinosa Systems Admin Sunguide ITS District VI ph. 305 4705830 fx. 305 4705832	<p>A ruggedized PC with adequate amount of serial ports for communications, Is the proposed ATC. I hope MS windows is banned from being a candidate OS. Linux, or other OS that are real time and work on PCs would be a better choice.</p> <p>The 2070 didn't make it. Is good to hear it; the wheel doesn't have to be reinvented.</p> <p>Imagine all the fancy stuff that can be done with a PC inside the cabinet (remember FORTRAN's Citilog video detector as an example).</p> <p>Ethernet should be the selected protocol suite to communicate back to the central system. (ethernet can easily run over a dial-up link, or a private DSL transportation network isolated from the Telco public side ) There are cool protocols like SMNP, that will spin around the way traffic lights are monitored or time adjusted. Among other functions like ITS, security, surveillance, etc.</p>	<p>Much of this will be resolved within the API standard.</p>
Gen	Jesus A. Martinez, P.E. Florida Department of Transportation ITS Administr., District 6	<p>I agree on choosing a ruggedized PC and Ethernet protocol.</p>	<p>Comment only.</p>
Gen	Mitretek	<p>Overall, the document provided sections for user needs, requirements, and design details. This is a move in the right direction to develop a complete and correct standard. However, (1) it was difficult to trace needs to design, (2) requirements were not well developed, and (3) design concepts were mixed with needs and requirements. This made the document difficult to use, hard to prove the design is complete with regard to user needs, and challenging to determine if there are holes in the design.</p>	<p>What this points out is that the format and traceability of the standard is poor and virtually non-existent. However, this is a hardware specification on</p>

			<p>which the applications are undefined at this point. In building hardware, we drew from past versions, and simply extended it to meet the overall requirements of technology advancement - more power and compatibility. Most of the rest of the 'needs' con-ops and requirements were an attempt to reverse engineer something that works and has been accepted into a package to meet Mitretek's view of a proper standard. Blake's comments are valid - what the demonstrate is that we should have stuck to the requirements - kept them simple and dropped the use case stuff.</p>
--	--	--	---

			We are in discussions with ITE as to whether this is within the scope of the original contract, and if not, what remedy is appropriate.
Gen	Wash DOT	<p>(Comment #1)</p> <p>I have reviewed the "Draft ATC Controller Standard" that was circulated from comment by field user's. Let me first admit that I'm old school technician trained and strongly feel that we must be mindful not to out run our existing work force with technology. The traffic signal industry has moved from electro-mechanical to solid state electronic and now can jump into the serial bus arena. This is a major leap forward in technology and my concern is that the existing work force will have a very difficult time with this system. The industry has always utilized a hard wired cabinet and the majority of folks conducting maintenance on these systems come from backgrounds trained in that segment of the electrical industry. I do recognize the need to address the standards in this industry, with all that's going on in the 170, 2070, and N.E.M.A. arena's, but again let's work within our existing work force. Just because we can do something new doesn't make it the right thing to do. Very few agencies working in the traffic signal industry now utilize the capability of the existing control equipment. Most of us do not have the time or luxury to devote the time to maximize these controllers. There is a point where you can over design and/or complicate things that create more trouble than it's worth. Some folks like a very sophisticated/complicated system, but I feel you limit your ability to respond and repair on street problems because you limit your available work force. When our roadways are not running over capacity our signal operate very well, but when capacity becomes an issue signal timing quickly becomes limited also. We will always face poor designs, over capacity and saturation of our intersections and new control equipment will</p>	Comment only. Software issue addressed by API.

	<p>not solve these issues.</p> <p>As I stated above, I am old school and I hope that these new standards will interface with our existing cabinets and will be available with hard wired cabinets in the future. If we were to install a new cabinet with this new serial bus design my available workforce would go from 15 to 3, plus I would have to invest in some expensive test equipment. We have current problems with filling electronic tech positions and if we seek a higher level of skills our salary structure will not support and/or attract the people with these skills. Thank you for an opportunity to comment.</p> <p>(Comment #2)</p> <p>The most significant change in the ATC is the Bus based communication/control system. This in my opinion is the way of the future, but is the source of a degree of trepidation (apprehension) among traffic signal electronics technicians. Lets face it some of us began working on traffic signal control equipment when it consisted of a single dial clock type device, we then progressed to single and multiple dial mechanical fixed time controller assemblies, on top of this we went on to electromechanical actuated controllers, then on to discrete component solid state controller assemblies and now we routinely maintain micro processor based controllers. The point being, this industry, much like the computer industry is continually advancing to the latest designs. Serial based controller assemblies is no greater step than any other we have thus far made, so lets go we can do this. In our evolving world there is no way an education we received prior to beginning our career will carry us through our working years. We must accept the fact that continuing education is a way of life for us all.</p> <p>Assuming that the hardware design has been well thought out the ATC platform should be a valuable tool for several years. The processing power and memory should allow for futures needs, as they are realized.</p> <p>The most critical item in the future of the ATC is that the available</p>	
--	--	--

		software continues to be upgraded to meet the complexities of our evolving signal systems. In today's world our greatest challenge is to be able to have sufficient staff levels with the skills to implement and maintain the ever more complex systems currently in use and being designed to handle our ever increasing traffic volumes. I believe that continuing education is the key to our success.	
Gen		Connecticut DOT's Division of Traffic Engineering has reviewed the subject standard and has no comments	No response needed.
Gen	Milton Dean	<p>We have reviewed the subject Standard and can offer no technical or editorial comments at the present time. We concur with the efforts to promote an industry standard for control equipment. We presently do not have an immediate need for such devices since we have recently signed a 10-year licensing agreement with Econolite for their OASIS/OSM 2070L controller and Translink32 closed loop system monitoring software packages.</p> <p>Please continue to keep us informed of your work in this area as we are always encountering new applications and challenges in managing traffic.</p>	
Intro	Starr/MN	<p>1. Document: ATC Controller Section: 1.1 Page: 1-1 Paragraph or Item: Scope and Figure 1-1 Comment: The last paragraph on the page and Figure 1-1 that follows should not require the controller to be modular. Modularity should be an option.</p> <p>2. Document: ATC Controller Section: 1.1 Page: 1-2 Paragraph or Item: Figure 1-1 Comment: In this figure or somewhere else, show the Communications Interface and clarify which serial ports, Ethernet hub ports, and parallel I/O go to which locations. For example, is the 9-pin connector pinout for SP6 that is shown in 6.1.3 supposed to be on a Communication</p>	All comments addressed through revisions in draft standard.

	<p>Interface card or is it on the front panel or inside the ATC housing or what? Which of the Ethernet hub ports is the one going to the Communication Interface? Where do Ethernet hub ports 2 and 6 go? How does the parallel I/O fit in with what is shown on Figure 1-1? These questions are not really answered in the standard.</p> <p>3. Document: ATC Controller Section: 1.1 Page: 1-2 Paragraph or Item: Figure 1-1 Comment: This figure shows ethernet hub port 5 going to the network and 6 going to host expansion, but section 7.3 shows them the other way around.</p> <p>4. Document: ATC Controller Section: 1.2.3 Page: 1-4 Paragraph or Item: Communications Board Comment: Is this talking about what is later called the Communications Interface, or is this something different? If this is the Communications Interface described in section 5, then change the name to Communications Interface.</p> <p>5. Document: ATC Controller Section: 1.2.3 Page: 1-4 Paragraph or Item: Communications Board Comment: If this is talking about the Communications Interface, then the 2nd paragraph does not belong in this section. Section 6, which the 2nd paragraph here references, is user interface front panel things, not the Communications Interface slot.</p> <p>6. Document: ATC Controller Section: 1.2.3 Page: 1-4 Paragraph or Item: Communications Board Comment: If this section is talking about the Communications Interface, then which list of interfaces is the last sentence of 1.2.3 referring to - the front panel user interfaces as per 6.1.1 or</p>	
--	---	--

		<p>the Communication Interface boards listed in section 5? The heading of this section implies it is talking about the Communication Interfaces, but the reference to Section 6 implies it is talking about the user interfaces. Clarify this point.</p> <p>7. Document: ATC Controller  Section: 1.3.1  Page: 1-5  Paragraph or Item: Normative References  Comment: This cites a document called ATC Environmental Specification, but it appears that the environmental specifications are part of this document rather than in a separate document.</p>	
Intro	Econolite	<p>Document: ATC Controller  Section: Figure 1-1 Component Parts of the ATC Controller and their Connections  Page: 1-2  Paragraph: NA  Comment: The figure seems to imply specification requirements for the Power Supply, such as the maximum 5 and 12 VDC power required. If these are requirements of the power supply they should be covered in the text of section 6.2 not in this figure.</p> <p>Document: ATC Controller  Section: 1.2.1 Form/Fit/Function  Page: 1-3  Paragraph: 4 - Line 19  Comment: Grammatical error – the statement “...capable of being mounting...” should be “...capable of being mounted...”</p> <p>Document: ATC Controller  Section: 1.2.1 Form/Fit/Function  Page: 1-3  Paragraph 9 - Line 25  Comment: Has an incorrect reference to NEMA 170/179 and NEMA 332 Cabinets. The Paragraph should read:    “Note that many of the design choices in this standard reflect the basic requirement that the ATC</p>	<p>Editorial changes made as recommended. Appropriate references added.</p>

		<p>provide backward interface compatibility with existing NEMA, Model 170/179 and ATC 2070 controllers and NEMA, Model 332 and Its Cabinets.”</p> <p>Document: ATC Controller  Section: 1.2.3 Communication Board  Page: 1-4  Paragraph: 3 - Line 18-20  Comment: The paragraph starting “Section 6 of this standard defines a minimum ...” does not seem to go with the title of this section (has nothing to do with the Communication Board). The last sentence of the paragraph also precludes using new approaches to the ATC user interface as they will be considered non-compliant.</p> <p>Document: ATC Controller  Section: 1.3.1 Normative References  Page: 1-5  Paragraph: 11  Comment: This section should refer to the actual standard name, number revision and source of each standard referenced in this standard. The current listing in this section is incomplete (as an example the Joint ATC 2070 standard is not included nor is there a standard referenced for the infrared interface of section 6, the EIA standards referred to later in the standard should also be included here).</p>	
Intro	Coughlin	<p># page section line comment proposal  since the decision was made to use Imperial units instead of metric, all temperature values should be converted to degress Fahrenheit for uniformity.  1-2 1.1 fig 1-1 serial port 8 is shown as serial port 7.  1-2 1.1 fig 1-1 host power shows +12 VDC (ISO). This is not required for ATC units with NEMA TS-1 or TS-2 type 2 PI/O.  1-2 1.1 fig 1-1 ethernet port 5 is shown as connecting to the front panel for controller diagnostics and ethernet port 6 is shown for host expansion; these are reversed in fig 7-3.  1-2 1.1 fig 1-1 shows AC or DC for service power; section 6.2.1 identifies power switch to disconnect AC from Power Supply.  1-2 1.1 fig 1-1 does not accurately convey AC service power being provided via NEMA TS-1, TS-2 Type 1 or TS-2 Type 2 PI/O  1-2 1.1 fig 1-1 shows Front Panel as part of Host Module.</p>	<p>The figure shows Serial Port 8  2. In the 2070 Concept the +12VDC Iso power supply was required whenever the Controller Used Outputs. This power supply provides isolation between the +5VDC power used by the CPU</p>

	<p>1-2 1.1 fig 1-1 where is "Backup Storage Device" defined?</p> <p>1-2 1.1 fig 1-1 requirements for Power Supply are not needed here.</p> <p>1-2 1.1 fig 1-1 "Program / Test" connector is not provided on production units. Suggest that it be deleted from figure.</p> <p>1-2 1.2 2 This section discusses the key elements of the controller, not the standard Suggest "Key Elements".</p> <p>1-3 1.2.1 8 "Pins designated as "Reserved" are intended for future enhancements to the Engine Board specification and are not to be used for any purpose. They shall be no-connects on both Engine Boards and Engine Board hosts." Suggest moving these sentences to Section 4.2. Also, suggest re-wording to "... future enhancements to this standard ... not connected on both the Engine Board and the Host Module."</p> <p>1-3 1.2.1 19 "Controller units shall be capable of being mounting in ..." Suggest "Controller units shall be capable of being mounted in ..."</p> <p>1-3 1.2.1 25 sentence contradicts previous sentence. Suggest deleting sentence and re-wording paragraph. Or, suggest moving entire section to Section 6.3.</p> <p>1-3 1.2.1 30 there are no "... NEMA Model 170/179 ... controllers" Suggest "... NEMA TS1 and TS2, Caltrans Model 170, NYDOT Model 179 and ATC 2070 controllers ..."</p> <p>1-4 1.2.2 5 Entire paragraph contains too much detail for Section 1.2, "Key Elements of the ATC Controller Standard". Suggest moving to Section 4.3.4, "Real-Time Clock (RTC)".</p> <p>1-4 1.2.3 18 "Section 6 of this standard defines a minimum set of interfaces for operation of the ATC and defines the allowable optional interfaces." Section 6 only defines the required and optional front panel interfaces.</p> <p>1-4 1.2.4 25 "This standard defined a minimum of four (4) general purpose serial communications ports for possible interface to external field devices." It is not clear if this quantity is correct as it is unclear to which ports it refers.</p> <p>1-4 1.2.4 35 there is no "Model 170 (or Caltrans 332) cabinet". Suggest "Model 332 cabinet".</p>	<p>and the Voltage that is exposed to the outside world. This really is a Host issue though.</p> <p>3. Yes it is a matter that could be revised on the Figure 1-1 or on 7-3</p> <p>4. I believe this AC DC circle was there to indicate that the source would be one or the other. They are mutually exclusive at this point. However, in most cases we would need AC for Linesync at the very minimum. I do not think a switch was involved.</p> <p>5. Perhaps we should clarify the block to read HOST POWER SOURCE.</p> <p>6. If a Host Module is to have a Front Panel this is what should go on it. Again, we are referring to a 2070 for a base.</p>
--	--	--

			<p>7. The Backup Storage Device was supposed to be there when the Host Module, i.e.. 20701B module was removed from the Controller this source was there for transport.</p> <p>8. If all we were talking about was the Engine Board that may be true. However, we are talking about a complete Unit of some sort. This complete unit could be represented by a Host Module or a Host Module and other elements such as a Front Panel and a Power Supply. One thing I am concerned about is, sometimes this specification seems to be about an Engine Board and a "Black Hole".</p> <p>9. The Program Test Connector really</p>
--	--	--	--

			<p>refers to a connector to install the Board Support Program, such as the BDM port needed by the Motorola 360.</p> <p>Port 7/ Port 8 question: Port 8 was determined in an earlier review cycle to be a legacy term no longer needed, so that port has been redesignated Port 7 (previously unused).</p>
ConOps		There's a typo on p. 2-4, line 17. The word "easily" was left out after "more".	This has been corrected.
ConOps	IL DOT	<p>Section: 2.2.2 Page: 2-3 Item: Typographical error on lines 33-34 Comment: A word or words is omitted from the sentence that appears here: "The Model 170 approach allows software which is written by an agency or other entity independent of the to be loaded and executed on the controller."</p> <p>Section: 2.3 Page: 2-5 Item: Typo. on line 10 Comment: Sentence on lines 10-11 has a mistake in it: "ATC manufacturers will provide an a library that supports the API standard and is compatible with their ATC hardware."</p>	All corrections made as indicated

		<p>Section: 2.5.3.2  Page: 2-13  Item: Punctuation on line 19  Comment: The word "manufacturer's" should read "manufacturers" to reflect plural possessive tense.</p> <p>Section: 2.6  Page: 2-14  Item: Punctuation on line 4  Comment: Replace first comma with a semi-colon or period.</p>	
ConOps	Rstart/MN	<p>8. Document: ATC Controller  Section: 2.2.1  Page: 2-2  Paragraph or Item: The NEMA Standard  Comment: In the last sentence of the second paragraph, add "and outputs" after "The inputs".</p> <p>9. Document: ATC Controller  Section: 2.2.1  Page: 2-3  Paragraph or Item: The NEMA Standard  Comment: In the last sentence of the first paragraph, change "allow for" to "provide for".</p> <p>10. Document: ATC Controller  Section: 2.2.1  Page: 2-3  Paragraph or Item: The NEMA Standard  Comment: In the last sentence of the second paragraph change "interchangeability" to "physical standardization".</p> <p>11. Document: ATC Controller  Section: 2.2.1  Page: 2-3</p>	Suggestions considered and incorporated.

	<p>Paragraph or Item: The NEMA Standard Comment: In the last paragraph, add a statement that the TS2 standard replaced individual Parallel I/O lines with time slots in a high speed serial data stream, reducing the amount of cabinet wiring and allowing easier addition of new features. This was the main change and is not stated.</p> <p>12. Document: ATC Controller Section: 2.2.1 Page: 2-3 Paragraph or Item: The NEMA Standard Comment: In the last paragraph, delete references to "safer", since I do not believe it could be proven whether TS1 or TS2 is safer.</p> <p>13. Document: ATC Controller Section: 2.2.1 Page: 2-3 Paragraph or Item: The NEMA Standard Comment: In the last sentence of the section, delete "and the reliance upon a single operating system". NEMA did not specify an operating system.</p> <p>14. Document: ATC Controller Section: 2.2.2 Page: 2-3 Paragraph or Item: The Model 170 Standard Comment: The line numbered as line 34 is missing a word between "the" and "to".</p> <p>15. Document: ATC Controller Section: 2.2.3 Page: 2-4 Paragraph or Item: The 2070 ATC Standard Comment: In line number 19 a closing parenthesis is missing.</p> <p>16. Document: ATC Controller Section: 2.3</p>	
--	--	--

	<p>Page: 2-6 Paragraph or Item: Functional needs Comment: The last paragraph indicates that there is a need to be able to upgrade the controller in the field without having to replace it in its entirety, and hence there is an engine board design. However, this is not really the need. Change it to indicate the need as being that the ATC has to provide for cost-effective field upgrades. Most of the cost will be in the engine board. Allowing a non-engine board design would allow the entire controller to be built with less expense such that it may be less expensive to replace a cost effective integrated controller than to replace just the engine board of an engine board controller. ATC controller manufacturers should be allowed to create innovative and cost effective designs.</p> <p>17. Document: ATC Controller Section: 2.4 Page: 2-6 Paragraph or Item: Operational Environment Comment: Change the term "Central Computer" to "Remote Computer" and use this term consistently throughout the document. "Remote computer" is used in later sections.</p> <p>18. Document: ATC Controller Section: 2.4 Page: 2-6 Paragraph or Item: Operational Environment Comment: At the end of the description of Central Computer (which should be changed to "remote computer") add "or from a field located computer, such as a traffic signal field master controller".</p> <p>19. Document: ATC Controller Section: 2 and 3 Page: 2-9 thru 3-7 Paragraph or Item: Representative Usage and Functional Requirements Comment: The use cases (sub-features) should have the same names and be in the same order in the requirements section as they are in the concept of operations section. Most of them are but some of them are worded differently or in a different order. Also, 3.3 for facilitating ease of maintenance and future H/W or S/W updates has a completely different set of sub-features listed</p>	
--	---	--

		<p>than does the same high level feature in 2.5.3. They should all be identical in both sections.</p> <p>20. Document: ATC Controller Section: 2.5.1.3 Page: 2-11 Paragraph or Item: Manage Clock/Calendar Function and Synchronize with Reliable External Source Comment: Reword the last sentence of the section. It is not clear what it is saying.</p> <p>21. Document: ATC Controller Section: 2.5.1.6 Page: 2-11 Paragraph or Item: Monitor and Verify Present Applications Status Comment: In the last sentence add "input and output states and timer countdowns" to the list of items that can be monitored.</p> <p>22. Document: ATC Controller Section: 2.5.2.1 Page: 2-12 Paragraph or Item: Manage/Control a Variety of External Field Devices Comment: This should be clarified to indicate that the controller itself can manage the external devices unattended, not just a remote computer, a local laptop, or an operator through the local controller front panel.</p> <p>23. Document: ATC Controller Section: 2.5.2.2 Page: 2-12 Paragraph or Item: Monitor the Status of a Variety of External Field Devices Comment: It is not clear whether reading the detector inputs in a signal cabinet falls under this feature or under Manage/Control a Variety of External Field Devices. Clarify the wording of both sections. If reading inputs is part of this section, then change the title to include "Inputs" as well as "Status" (or "outputs", depending on how you look at it. The output of the external device is the input to the controller).</p>	
--	--	---	--

		<p>24. Document: ATC Controller Section: 2.5.3.2 Page: 2-13 Paragraph or Item: Maintain/Update Controller Software Comment: This appears to duplicate 2.5.1.1 Install/Update Applications Software Quickly and Efficiently.</p> <p>25. Document: ATC Controller Section: 2.7 Page: 2-14 Paragraph or Item: Modes of Operation Comment: In the third paragraph, replace "directly controls the external device(s) connected to the ATC" with "controls the external device(s) via commands to the ATC". It is not direct if it goes through the ATC.</p> <p>26. Document: ATC Controller Section: 2.7 Page: 2-14 Paragraph or Item: Modes of Operation Comment: In the last sentence of the section, add the word "Local" at the beginning of the sentence.</p>	
ConOps	Econolite	<p>Document: ATC Controller Section: 2.2.1 The NEMA Standard Page: 2-3 Paragraph: Line 9-11 Comment: The TS-1 1989 revision did NOT define a new standard for communications nor a definition for a fourth connector. There is no NEMA definition for a fourth or D connector and a communication standard was not covered by NEMA until TS-2. The TS-1 1989 revision further defined/standardized actuated intersection control, provided standards for all cabinet components and added test procedures, and improved interchangeability between manufacturers equipment (reference History section of TS-2).</p> <p>Document: ATC Controller Section: 2.2.1 The NEMA Standard</p>	Revisions considered and incorporated.

	<p>Page: 2-3 Paragraph: Line 25-26 Comment: The statement “The ATC standard addresses both the interchangeability of software, the standardization of displays and the reliance upon a single operating system.” is not accurate. The ATC standard in theory will be standardizing an API not an operating system (depending on the final direction taken).</p> <p>Document: ATC Controller Section: 2.2.2 The Model 170 Standard Page: 2-3 Paragraph: Line 34 Comment: The statement “...of the to be loaded ...” seems to be an incomplete thought.</p> <p>Document: ATC Controller Section: 2.2.3 The 2070 ATC Standard Page: 2-4 Paragraph: Throughout standard Comment: We need to be consistent in our the 2070 is referenced in this standard. Sometimes the reference is 2070 ATC other times it is ATC 2070 and still others it is just 2070. The reference should be ATC 2070.</p> <p>Document: ATC Controller Section: 2.2.3 The 2070 ATC Standard Page: 2-4 Paragraph: Line 17 Comment: The statement “Such high level language programs are more written and debugged...” is grammatically incorrect.</p> <p>Document: ATC Controller Section: 2.2.3 The 2070 ATC Standard Page: 2-4 Paragraph: Line 19 Comment: There is a parenthesis missing after (OS-9.</p>	
--	---	--

		<p>Document: ATC Controller  Section: 2.3 Functional Needs  Page: 2-5  Paragraph: Line 8-10  Comment: The sentence “The API standard will specify a source code level interface defined by high-level language function descriptions and header information.” may not longer be correct based on the latest issues facing the API Working. A number of references in this standard will need to be changed to reflect the outcome of POSIX vs LINUX issue currently being voted on by the Joint Committee.</p> <p>Document: ATC Controller  Section: 2.3 Functional Needs  Page: 2-5  Paragraph: Line 26  Comment: ethernet should be Ethernet. This should be checked in the rest of the standard.</p> <p>Document: ATC Controller  Section: 2.4 Operational Environment  Page: 2-7  Paragraph: Line 15-17  Comment: The standard is not consistent in how the ITS Cabinet standard is referenced. In cases ITS cabinet standard is used and in others ITS Cabinet standard it used. If this is a title of a standard it should be consistently stated as ITS Cabinet standard.</p> <p>Document: ATC Controller  Section: 2.7 Modes of Operation  Page: 2-14  Paragraph: Line 12-13  Comment: The statement “...developed with these three modes of operation in mind” should be “...developed with the following three modes of operation in mind”.</p>	
ConOps	USTraffic	<p>Page 2-5 line 24 (Section 2.3) and page 6-3 line 10 (6.1.2.2 point 5):  "networking is Ethernet, not USB" - precludes the use of wireless USB modems available today. These modems use USB because serial ports are not fast enough and because most desktops and laptops don't come with two Ethernet ports.</p>	<p>This design choice is an interesting option but not one deemed necessary</p>

			by designers of this standard.
ConOps	Coughlin	<p>2-2 2.1 11 "With "Open Systems", a user can write, or have someone else write, their own software ..." This sentence is grammatically incorrect as "user" is singular whereas "their" is plural. Suggest "... a user can write, or have someone else write, her own software ..." or "an agency ... its own software ..."</p> <p>2-2 2.2.1 30 this section discusses both the NEMA TS-1 and TS-2 standards. Suggest "The NEMA Standards" (plural).</p> <p>2-3 2.2.2 28 there is no "Model 170 Standard". Suggest "The Model 170 Specification".</p> <p>2-4 2.2.3 8 there is no "2070 ATC Standard". Suggest "The ATC 2070 Standard".</p> <p>2-5 2.3 19 Figure 2-1 illustrates the architecture of all of the software in an ATC, not just the API. Suggest "Figure 2-1: ATC Software Architecture".</p> <p>2-5 2.3 23 "ITS data communications networks are deploying NTCIP and Internet Protocol (IP) based data communications networks." This incorrectly implies that NTCIP requires network-based communications.</p> <p>2-6 2.3 11 The term "field-upgradeable" needs to be defined as it doesn't specify the required tools, skills and/or environment (field, shop, other). For example, is the Engine Board intended to be swapped on the side of the road *or* in the shop?</p> <p>2-10 2.5.1 Many of the sub-features have subjective phrasing: "install / update ... quickly and efficiently". "manage ... with reliable external source", "configure and verify parameters for particular local applications". Suggest re-wording to avoid / minimize subjectiveness.</p> <p>2-14 2.7 27 "... commands are sent from control center / master to the ATC via the communications network to affect the operation of local device(s) connected to the ATC." Suggest re-wording to indicate that actual control of the device is hadled through applications software (aka "device driver") in the ATC.</p>	Changes made.
Funct. Req'mts	Rstarr/Mn	<p>27. Document: ATC Controller</p> <p>Section: 3</p> <p>Page: 3-1 thru 3-7</p> <p>Paragraph or Item: Functional Requirements</p> <p>Comment: The requirements should be more complete and specific. They should be a good explanation of what the ATC has to be able to do to support applications. The design should be based on the requirements, and the requirements as currently written are not complete or specific enough to support the design. Having good requirements will help manufacturers and users to</p>	Comments to be considered when section is extensively revised after balloting

	<p>understand what the intent is of the various design features.</p> <p>28. Document: ATC Controller Section: 3 Page: 3-1 thru 3-7 Paragraph or Item: Functional Requirements Comment: The requirements section should not include design information, only functional requirements. The design is in the later sections. For example, a requirement to be able to access the ATC via a laptop computer should not specify a serial port. The ATC serial port is the design that supports the requirement of local access from a laptop, not the actual requirement. Many of the requirements are just a list of design features, not the requirement that the design feature is supposed to meet. The design should be traceable to requirements and the requirements should trace to a design.</p> <p>29. Document: ATC Controller Section: 3 Page: 3-1 thru 3-7 Paragraph or Item: Functional Requirements Comment: The requirements section should include performance requirements also. For example, in Manage/Control a Variety of Field Devices, there should be a requirement for latency between a change of state of an input and the time that the application is made aware of the change. Similarly with latency of outputs.</p> <p>30. Document: ATC Controller Section: 3 Page: 3-1 thru 3-7 Paragraph or Item: Functional Requirements Comment: As much as possible, the requirements should have a subject, a "shall", and a predicate, and be in the active voice. It should be a requirement on the ATC and its components, not on external components. Other sentence constructions lead to ambiguity. Active voice clarifies who or what will be performing the required function. An example of a poorly worded requirement is 3.1.1, Install and update Applications Software. It has an incomplete sentence followed by a bullet list of design features and what they are for, but does not state them as requirements. It indicates that "Locally" is satisfied by requirements, but the requirements are the</p>	
--	--	--

	<p>things that need to be satisfied, not the things doing the satisfying. Write all the requirements in a proper form.</p> <p>31. Document: ATC Controller Section: 3 Page: 3-1 thru 3-7 Paragraph or Item: Functional Requirements Comment: Number each requirement separately for reference and tracing. Do not combine multiple requirements into one statement. This allows a manufacturer to indicate which optional requirements they meet and don't meet, as well as the purchaser to specify which optional requirements they want and don't want.</p> <p>32. Document: ATC Controller Section: 3.1.1 Page: 3-1 Paragraph or Item: Install and Update Applications Software Comment: Under Locally it mentions a "dedicated" serial and Ethernet port. Under Remotely it mentions a "separate" serial and Ethernet port. Are these really dedicated and separate, or are these general purpose ports that can be used for whatever is needed? Clarify this and reword the requirement.</p> <p>33. Document: ATC Controller Section: 3.1.1 Page: 3-1 Paragraph or Item: Install and Update Applications Software Comment: In the last bullet on the page, "initialing" should be "initiating".</p> <p>34. Document: ATC Controller Section: 3.1.2 Page: 3-2 Paragraph or Item: Installing and Upgrading the Operating System Software Comment: Change the title to "Installing, Operating, and Upgrading the Operating System Software". Add requirements for operating system functions that the operator should be able to do. For example, add a requirement for resetting or restarting the whole system or terminating</p>	
--	--	--

and restarting an unresponsive application.

35. Document: ATC Controller

Section: 3.1.2

Page: 3-2

Paragraph or Item: Installing and Upgrading the Operating System Software

Comment: Delete the parenthetical "(or, optionally remotely)" and just leave the existing "and remotely".

36. Document: ATC Controller

Section: 3.1.2

Page: 3-2

Paragraph or Item: Installing and Upgrading the Operating System Software

Comment: In the last sentence, change "of the preceding section" to "of section 3.1.1" to clarify the reference.

37. Document: ATC Controller

Section: 3.1.3

Page: 3-2

Paragraph or Item: Maintain Clock/Calendar Function and Synchronize with Reliable External Sources As Needed

Comment: Add a requirement that the clock calendar function shall support the clock/calendar functionality described in NTCIP 1201, Global Objects for globalTime and globalDaylightSaving objects.

38. Document: ATC Controller

Section: 3.1.3

Page: 3-2

Paragraph or Item: Maintain Clock/Calendar Function and Synchronize with Reliable External Sources As Needed

Comment: Second main bullet. While timers need 1/10th second accuracy, the clock/calendar does not need precision greater than 1 second.

39. Document: ATC Controller

	<p>Section: 3.1.3 Page: 3-2 Paragraph or Item: Maintain Clock/Calendar Function and Synchronize with Reliable External Sources As Needed Comment: In the 1st sub-bullet under the first bullet, and in the 4th main bullet, add "to 1/10th second precision" if that is a requirement. It may not be required for the clock to have 1/10th second precision, only timers.</p> <p>40. Document: ATC Controller Section: 3.1.3 Page: 3-2 Paragraph or Item: Maintain Clock/Calendar Function and Synchronize with Reliable External Sources As Needed Comment: In the 2nd sub-bullet under the first bullet, add "without AC power applied to the controller" at the end of the sentence.</p> <p>41. Document: ATC Controller Section: 3.1.3 Page: 3-2 Paragraph or Item: Maintain Clock/Calendar Function and Synchronize with Reliable External Sources As Needed Comment: Delete the 2nd main bullet. Setting the time and date should be accomplished by accessing the operating system from a remote computer, local laptop, or operator utilizing the front panel, not by an application. If there are multiple applications running simultaneously, you do not want them all to be able to set the controller time.</p> <p>42. Document: ATC Controller Section: 3.1.5 Page: 3-3 Paragraph or Item: Uploading/Downloading Data Block(s) Comment: In the first sentence, delete the word "new". It can download existing databases as well as new ones.</p> <p>43. Document: ATC Controller</p>	
--	---	--

	<p>Section: 3.1.5 Page: 3-3 Paragraph or Item: Uploading/Downloading Data Block(s) Comment: Under Locally and under Remotely, change "Communication port" to the appropriate name, whichever port was intended. Better yet, delete the reference altogether because the sentence is stating the design solution but should instead state the requirement. Change it to require that the ATC shall provide for uploading and downloading data blocks locally from a laptop computer or PDA and remotely from a remote computer.</p> <p>44. Document: ATC Controller Section: 3.1.5 Page: 3-3 Paragraph or Item: Uploading/Downloading Data Block(s) Comment: Under Locally, change "configuring/verifying application parameter(s) from this device" to "uploading/downloading data block(s)", since the upload/download can be for more than just configuring/verifying application parameters.</p> <p>45. Document: ATC Controller Section: 3.1.5 Page: 3-3 Paragraph or Item: Uploading/Downloading Data Block(s) Comment: Under Remotely, change "remote system interface" to "Ethernet port". Better yet, delete the reference altogether because the sentence is stating the design solution, but should state the requirement.</p> <p>46. Document: ATC Controller Section: 3.1.6 Page: 3-3 Paragraph or Item: Monitoring and Verifying Present Application Status Comment: In the first paragraph, add "input and output states, timer countdowns, and alarm states" to the list of items monitored. All of the items listed should be separate requirements.</p> <p>47. Document: ATC Controller Section: 3.1.6</p>	
--	---	--

		<p>Page: 3-3 Paragraph or Item: Monitoring and Verifying Present Application Status Comment: In the second paragraph, change "Communication ports" to the correct name. Better yet, change this to document the requirement rather than stating the design solution.</p> <p>48. Document: ATC Controller Section: 3.1.6 Page: 3-3 Paragraph or Item: Monitoring, and Verifying present Application Status Comment: Separate each of the items indicated in the first paragraph into a separate requirement stating that the ATC shall indicate the status of that item on the front panel, locally on a laptop, and remotely, all as separate requirements.</p> <p>49. Document: ATC Controller Section: 3.1.6 Page: 3-3 Paragraph or Item: Monitoring, and Verifying present Application Status Comment: Add a requirement on the latency. For the front panel, the local laptop, and the remote computer, what is the maximum time from a change in state of the item being monitored until it is displayed in that mode?</p> <p>50. Document: ATC Controller Section: 3.1.6 Page: 3-4 Paragraph or Item: Monitoring, and Verifying present Application Status Comment: In the 1st bullet under Remotely, replace the vague reference "Requirements listed above, and" with a specific reference that says what preceding part of the document is being referred to.</p> <p>51. Document: ATC Controller Section: 3.1.6 Page: 3-4 Paragraph or Item: Monitoring, and Verifying present Application Status Comment: Add a requirement (which should be optional) for the ATC to initiate a call-back to</p>	
--	--	--	--

		<p>the remote computer upon specified alarm conditions.</p> <p>52. Document: ATC Controller Section: 3.1.7 Page: 3-4 Paragraph or Item: Allowing Operator Control of Application(s) Comment: This section indicates that starting, stopping, and controlling run times of application remotely is not supported. This must be supported. Our experience with new applications running in the field is that you sometimes have to stop and restart an application that has stopped responding. The controller should provide a way to do this remotely through the operating system.</p> <p>53. Document: ATC Controller Section: 3.1.8 Page: 3-4 Paragraph or Item: Facilitate the Long Term Retention of Data Comment: The requirement should be that the ATC shall provide the logging functionality described in NTCIP 1201, Global Objects. A matrix somewhere should identify this requirement as optional.</p> <p>54. Document: ATC Controller Section: 3.2.1 Page: 3-4 Paragraph or Item: Monitor the Status of External Field Devices Comment: Write specific separate requirements as to what types of status or inputs the ATC must monitor. This would include monitoring 24 VDC on/off logic inputs, 12 VDC on/off logic inputs, and serial status and input messages from external devices having interfaces defined in NEMA TS-1, NEMA TS-2, CALTRANS TEES, and the ITE/NEMA/AASHTO ITS Cabinet standard. A matrix somewhere would indicate which of these are optional versus mandatory and allow the purchaser to indicate which of the optional requirements are being requested.</p> <p>55. Document: ATC Controller Section: 3.2.2 Page: 3-5</p>	
--	--	---	--

	<p>Paragraph or Item: Manage/Control a Variety of External Field Devices  Comment: This is the whole purpose of the ATC controller, and so it should have complete and specific requirements. Write specific separate requirements as to what types of control or status outputs the ATC must provide. This would include 24 VDC on/off logic outputs, 12 VDC on/off logic outputs, and serial status and output messages to external devices having interfaces defined in NEMA TS-1, NEMA TS-2, CALTRANS TEES, and the ITE/NEMA/AASHTO ITS Cabinet standard. A matrix somewhere would indicate which of these are optional versus mandatory and allow the purchaser to indicate which of the optional requirements are being requested.</p> <p>56. Document: ATC Controller  Section: 3.2.2  Page: 3-5  Paragraph or Item: Manage/Control a Variety of External Field Devices  Comment: Add a requirement for latency between the time that the application is requests a change of state and the time of the change in state of the output (or completion of sending a serial output message).</p> <p>57. Document: ATC Controller  Section: 3.2.2  Page: 3-5  Paragraph or Item: Manage/Control a Variety of External Field Devices  Comment: Add a requirement for the ATC to provide schedule based control as described in NTCIP 1201 Global Objects. A matrix somewhere should identify this as optional or mandatory.</p> <p>58. Document: ATC Controller  Section: 3.2.2  Page: 3-5  Paragraph or Item: Manage/Control a Variety of External Field Devices  Comment: Add a requirement for the ATC to provide control based on timers (as opposed to scheduler), including the resolution of the timer and concurrent timers. A matrix somewhere should identify this as optional or mandatory and should identify the number of concurrent timers required. Timers could be hardware or software based, but the ATC must be able to support the resolution of the timer in the design section, such as by providing a signal based on the 60 Hz power line frequency.</p>	
--	---	--

		<p>59. Document: ATC Controller  Section: 3.3  Page: 3-5 thru 3-7  Paragraph or Item: Facilitate Ease of Maintenance and Future Hardware or Software Updates  Comment: Add requirements in this section for diagnostics for communications and watchdog failures, as well as other diagnostics that would facilitate ease of maintenance.</p> <p>60. Document: ATC Controller  Section: 3.3.2 and 3.3.2.2 and 3.3.2.3  Page: 3-6 and 3-7  Paragraph or Item: Provide a Platform that allows for hardware Upgrades  Comment: The engine board and communications interface are not requirements, but rather design features. These should be removed from the requirements. These could be replaced with requirements for cost effective technology upgrades and a requirement for flexibility in the communications choices.</p>	
Funct. Req'mts	IL DOT	<p>Section: 3.2.1  Page: 3-5  Item: Punctuation on line 15  Comment: Remove period at end of line. Colon to remain.</p> <p>Section: 3.3.2  Page: 3-6  Item: Sentence on line 6  Comment: Second sentence in the paragraph does not make sense with the words: "...engine board from,..." Probably should be: "...engine board form..."</p> <p>Section: 3.3.2.1  Page: 3-6</p>	Recommendations incorporated.

		<p>Item: Typo. on line 14  Comment: Change the word "mounting" to "mounted."</p> <p>Section: 3.3.2.3  Page: 3-7  Item: Paragraph on lines 4 through 7  Comment: Delete this paragraph as it is a repeat of the prior paragraph.</p> <p>Section: 3.3.2.3  Page: 3-7  Item: Paragraph on lines 9 through 12  Comment: Delete this paragraph as it is a repeat of the second sentence in the first paragraph on page 3-6 (lines 5 through 8).</p>	
Funct. Req'mts	Econolite	<p>Document: ATC Controller  Section: 3 Functional Requirements  Page: 3-1  Paragraph: Line 17  Comment: "can not" should be "cannot"</p> <p>Document: ATC Controller  Section: 3.1 Manage/Configure Controller Applications  Page: Throughout section  Paragraph:  Comment: The language of the standard in this and following section 3 requirements does not seem to be consistent. Some of the language appears to be specification requirements as statements are preceded by "shall". Other sections use language that is a statement of fact. Design requirements of the standard should not be in this section. They should be included in section 4 through 7 as appropriate.</p> <p>Document: ATC Controller  Section: 3.2.2 Mange/Control a variety of External Field Devices  Page: 3-5</p>	Recommendations incorporated.

		<p>Paragraph 5 - Line 20  Comment: There does not seem to be any text under this heading?</p> <p>Document: ATC Controller  Section: 3.3.2.1 Standardize Controller Packaging  Page: 3-6  Paragraph 6 Line 22-23.  Comment: These lines limit the unit's dimensions to being no greater than those of the current ATC 2070. – This conflicts with the statements in Section 6.3.1.4 Page 6-16 where the size of the ATC is limited to 4U. The ATC 2070 with the 2070-8 module is in excess of 12 inches high.</p> <p>Document: ATC Controller  Section: 3.3.2.3 Optional Communication Interface  Page: 3-7  Paragraph: Lines 4-7  Comment: These lines are a repeat of text included at the beginning of this section</p>	
Funct. Req'mts	Coughlin	<p>3-2 3.1.3 24 As Imperial units are to be used throughout this standard, "25 °C" needs to be converted to "°F".</p> <p>3-3 3.1.4 15 Where is "remote system interface" defined?</p> <p>3-5 3.1.6 9-12 This paragraph is somewhat confusing. Suggest re-wording.</p> <p>3-5 3.1.6 14 "One dedicated synchronous serial port to directly interface to an ITS or NEMA TS2 Type 1 cabinet or interface via a parallel I/O module to a NEMA TS2 Type 2 or Model 332 cabinet." This requires the PI/O to be connected using a sync serial port. My understanding at the San Diego meeting was that this interface was not going to be standardized, but was to be left to each manufacturer; if so, suggest re-wording.</p> <p>3-6 3.3.2.1 14-23 These details should be moved to Section 6.3. They also duplicate portions of Section 1.2.1</p> <p>3-6 3.3.2.3 35 This wording could be interpreted that the Communications Module connector is optional (instead of optionally providing a compliant Communications Module installed in the required connector). Suggest re-wording.</p> <p>3-7 3.3.2.3 4-7 This paragraph duplicates the previous paragraph. Suggest deleting this paragraph.</p>	Most editorial changes made. Additional changes to be incorporated during section revision following balloting.
Engine	Batteiger	ATC spec rev 4 Page 4-15 Line 9-10 USB definition.	Response from a

Board		<p>To be compliant with the USB specification the host controller must supply the VBUS power. Reference section 4 of the USB specification. The host controller must be able to detect over current conditions on the USB bus. The signals required are VBUS, D-, D+, gnd. VBUS is 5v @500ma. This will require additional power to be available for the engine board to supply USB as well as engine board components. This will require assigning additional pins on the engine board I/O connector.</p>	<p>member of the consultant team (principally) responsible for the Engine Board detail in the ATC Standard: I understand that many USB controller ICs provide for sourcing Vbus as you describe, however I was not aware that it was a strict requirement of the USB specification. Could you please clarify, by precise subsection number, where in the specification you believe this requirement is noted?</p>
Engine Board	Betteiger	<p>Please look at section 4.3 &amp; 7.2 of the USB specification. I am looking at the 2.0 spec. This part of the spec is common for earlier version of the spec. The issue will be that the USB disk "keys" are USB powered devices. These devices rely on the USB host power supply for operation.</p>	<p>We're not questioning that the bus needs to provide power. We are only questioning the 'requirement' that the Vbus supply actually has</p>

			<p>to come from the USB controller IC itself, rather than the more general unit power supply. Wasn't that the point that you were making or did I misunderstand? Spec. Section 7 contains several examples, specifically those regarding self-powered hubs, where downstream power does NOT come from the controller IC itself. I understand that, strictly interpreted, the specification requires the reporting via software of overcurrent conditions on Vbus, but in this application the reporting of such events is of</p>
--	--	--	--

			<p>significantly less value than the proper handling (in hardware) of such an event, through the use of a polyfuse or solid-state switch.</p> <p>The concern in this application was that running large currents through the Engine Board, and particularly driving loads which can be inserted and removed at any time, could present a significant reliability issue.</p>
Engine Board	Batteiger	<p>How do you plan to meet the requirement for detecting over current reporting ? Most controllers have a current limited supply and detection circuitry built in. This protects the USB bus devices and the controller from driving a shorted bus. A fuse will protect the power supply but not the controller. I do not think reliability is an issue as much as ground bounce or engine board power sags when devices are plugged in. Most USB chips are designed to protect themselves in case of short circuit or device failure. Have you looked at the specs of any of the OHCI or EHCI host chips ? Unless you are planning on requiring a Hub device on the carrier board I think you will need to provide VBUS power from the Host controller. This may solve you problem, both from a power and signal point of view. The Hub device would provide the power</p>	<p>1. We are not requiring a full implementation of the USB specification, only that functionality necessary for the support of USB memory devices. Reporting of an overcurrent condition is not</p>

		<p>Downstream, report over current and protect the Host controller interface.</p>	<p>required. You are correct that most USB ICs provide internal current-related protection.</p> <p>2. The reliability concern I mentioned was exactly because of power and ground anomalies caused by devices inserted and/or removed.</p> <p>3. We are not requiring a hardware hub.</p> <p>To reiterate, the USB port on the ATC is not intended to be a full-blown USB implementation, but to support the transfer of files to/from the controller via USB memory devices.</p>
<p>Engine Board</p>	<p>Batteiger</p>	<p>I understand that the desire is to implement a subset of USB. However sometimes implementing a subset is more work than implementing a</p>	<p>I don't believe that we have precluded</p>

		<p>compliant solution. Except for UHCI (USB 1.1) drivers and chips which are extremely CPU intensive, OHCI (USB 1.1) and EHCI (USB 1.1/2.0) chips support a complete USB solution. By providing a sufficient Power Supply to the engine board the problems with Power sag and ground bounce should be handled. Since the addition of USB will require extra power to the CPU card carrier, why not provide this power to the engine board and allow it to provide a compliant solution. This will allow vendors to use standard off the shelf solutions for hardware and software. I do know of some non-standard USB solutions available that will also do what you are requiring but they are not supported by any major software vendor. They require custom drivers and tend to be very CPU intensive.</p> <p>The only difference in a USB compliant system and one that handles USB storage devices (USB KEYS) is the class drivers. Everything else is the same.</p>	<p>the use of off-the-shelf USB implementations in any way. The software-notification-of-overcurrent requirement would simply be non-functional.</p> <p>We will reconsider this within the team. Note that other design considerations have made us very hesitant to route bus power through the Engine Board.</p> <p>Later: No changes have been made to the USB portion of the Standard.</p>
Engine Board	USTraffic	<p>Manufacturer interchangeability - it has been stated that manufacturers will be "encouraged" to develop optional I/O, devices, etc. on the engine board, but this development will preclude interchangeability with any other engine board.</p>	<p>There has been no 'encouragement' for manufacturers to provide additional I/O which is not included in the Engine Board pinout specification.</p>

			Enhancements such as improved performance and additional memory will not impact the pinout and therefore not affect interchangeability.
Engine Board	Rstarr/Mn	<p>61. Document: ATC Controller Section: 4.3.2 Page: 4-6 Paragraph or Item: Startup Considerations Comment: In the first sentence delete the words "traffic control" since it could be any type of application.</p> <p>62. Document: ATC Controller Section: 4.3.3 Page: 4-7 Paragraph or Item: Flash Memory Comment: In the 2nd sentence, change "for use by" to "to store".</p> <p>63. Document: ATC Controller Section: 4.3.3 Page: 4-7 Paragraph or Item: Flash Memory Comment: In the 2nd sentence, add "in addition to FLASH memory required to store the operating system software".</p> <p>64. Document: ATC Controller Section: 4.3.3 Page: 4-7 Paragraph or Item: Flash Memory Comment: The 1st sentence of the 1st paragraph seems to indicate that the purpose of the FLASH memory is to store the software, but the 1st sentence of the 2nd paragraph seems to</p>	<p>61. Document: ATC Controller Done.</p> <p>62. Document: ATC Controller Done.</p> <p>63. Document: ATC Controller Added 'exclusively' to sentence.</p> <p>64. Document: ATC Controller Applications do not (necessarily) store data in FLASH memory. However, 'application' software IS responsible for</p>

		<p>indicate it is for the application software to store data. Clarify the purpose of the FLASH memory.</p> <p>65. Document: ATC Controller Section: 4.3.3 Page: 4-7 Paragraph or Item: Flash Memory Comment: In the second paragraph clarify whether it is the FLASH memory which is not to be corrupted or the application software.</p> <p>66. Document: ATC Controller Section: 4.3.3 Page: 4-7 Paragraph or Item: Dynamic RAM Comment: At the end of the 1st sentence add "and O/S execution" or "in addition to the RAM required for O/S execution", whichever is correct.</p> <p>67. Document: ATC Controller Section: 4.3.4 Page: 4-7 Paragraph or Item: Real-Time Clock Comment: Clarify the intent of the real time clock. Is it just for scheduling tasks, or is it also a hardware timer for use in timing signal phases, for example. If it is just for scheduling tasks, NTCIP 1201 only allows setting the clock to the nearest second and scheduling tasks to the nearest minute. In that case, 0.1 second resolution is not needed.</p> <p>68. Document: ATC Controller Section: 4.3.4 Page: 4-7 Paragraph or Item: Real-Time Clock Comment: The 2nd sentence indicates the clock must track only to the seconds, but the 3rd sentence says it must be 0.1 second resolution. To be 0.1 second resolution it would need to track tenths of seconds.</p>	<p>storing other applications to FLASH, which was the primary intent of this statement.</p> <p>Regardless of the nature of the operation, FLASH must be handled properly during power failure conditions.</p> <p>65. Document: ATC Controller FLASH (clarification added).</p> <p>66. Document: ATC Controller Changed to include O/S execution.</p> <p>67. Document: ATC Controller The requirement is that the actual time maintained by the</p>
--	--	---	--

	<p>69. Document: ATC Controller Section: 4.3.4 Page: 4-7 Paragraph or Item: Real-Time Clock Comment: The 3rd sentence indicates a required 1 second accuracy, but does not state the time period over which it can drift the 1 second. 1 second in 30 days? 1 second in 24 hours? Provide a more clear definition of the accuracy.</p> <p>70. Document: ATC Controller Section: 4.3.4 Page: 4-7 Paragraph or Item: Real-Time Clock Comment: The last sentence of the 1st paragraph calls for a standby clock accuracy of 0.005 percent per 30 days at a constant 25 degrees C. That converts to over 2 minutes drift in 30 days. It would seem that at the constant temperature of 25 degrees, it should be possible to get a better accuracy. A watch or the clock in a car is much more accurate than that and goes through temperature changes.</p> <p>71. Document: ATC Controller Section: 4.4.1 Page: 4-8 Paragraph or Item: Power Comment: In the 1st sentence of the 4th paragraph, change "not required to" to "not permitted to" to match what is stated later in the paragraph.</p> <p>72. Document: ATC Controller Section: 4.4.1 and 6.2.4 Page: 4-8 and 6-11 Paragraph or Item: Power and +5VDC Standby Power Comment: In 4.4.1, the 4th paragraph, the 4th sentence says that VSTANDBY_5 goes over the range of VPRIMARY down to 2.0 VDC. The 6th sentence gives the current draw over the voltage range of 4.5 VDC down to 2.0 VDC. However, VPRIMARY is said in the 1st paragraph to be from 4.8 to 5.2 VDC. Is the range of VSTANDBY_5 5.2 volts down to 2.0 volts, or 4.5 volts down to 2.0 volts? Then the power supply specification in 6.2.4 says that the standby source</p>	<p>RTC be accurate to within 1/10 second.</p> <p>68. Document: ATC Controller  Again, the desired behavior is to track actual time with 1/10 resolution. This does not actually require maintaining 1/10 seconds, so long as the capability exists for setting (and reading) the clock to precise seconds (zero tenths).</p> <p>69. Document: ATC Controller  Stated later in the paragraph.</p> <p>70. Document: ATC Controller  No change.</p> <p>71. Document: ATC Controller</p>
--	---	--

	<p>has to provide a specific current over a voltage of range of +5 to +2 VDC, which is different still. Clarify these apparent discrepancies.</p> <p>73. Document: ATC Controller Section: 4.4.1 Page: 4-8 Paragraph or Item: PCB Layout Considerations Comment: Clarify the 2nd sentence. Replace "all power planes" with "all power supply sources" if that is what is intended. Is this saying that the engine board must be a multilayer board with separate layers for each power supply source and ground, or only that if that construction is used then no other traces can appear on those layers?</p> <p>74. Document: ATC Controller Section: 4.4.1 Page: 4-9 thru 4-11 Paragraph or Item: Power Interruption and Restoration Comment: In Figure 4-3 and the discussion of POWERUP and POWERDOWN it appears to be saying that when POWERDOWN is low and POWERUP transitions to low, then the engine board is supposed to restart. However, it says that POWERDOWN is low when the ATC has lost power and the POWERUP transitions to low only when the ATC has lost power for more than the short power outage time. How can the engine board restart if it has no power? Wouldn't you want it to restart when these lines come back up high, indicating restoration of power? Or, maybe the intent is to reset whenever the Engine Board has power and both POWERDOWN and POWERUP are in the low state (as opposed to transitioning to low). In this case, in the paragraph for POWERUP, change the first "A HIGH-to-LOW transition" to "A low state", and in Figure 4-3 move the "(reset)" one box to the right under "external power restored".</p> <p>75. Document: ATC Controller Section: 4.4.3 Page: 4-11 Paragraph or Item: Serial Interface Ports Comment: This paragraph says the pins operate at HCT logic levels. This is referenced in some other places in the standard also. Figure 1-1 says these operate at TTL logic levels. Maybe it would be better just to indicate "5-volt logic levels" or just "logic levels", as is done some other</p>	<p>Changed.</p> <p>72. Document: ATC Controller</p> <p>The requirement as specified in this section stands. The maximum average current draw is to be measured over the standby voltage range of 4.5 VDC to 2.0 VDC.</p> <p>73. Document: ATC Controller</p> <p>Language revised.</p> <p>74. Document: ATC Controller</p> <p>POWERUP section clarified to indicate cold restart is to be performed once controller power has been restored (both POWERUP and POWERDOWN are both HIGH).</p> <p>75. Document: ATC</p>
--	--	---

		<p>places in the standard. If you keep the HCT, add it to the acronym list.</p> <p>76. Document: ATC Controller Section: 4.4.3 Page: 4-13 Paragraph or Item: Serial Interface Ports Comment: The description of the serial ports shows a serial port numbered SP8, but none numbered SP7. Figure 1-1 shows SP7 and not SP8. Correct the discrepancy in numbering.</p> <p>77. Document: ATC Controller Section: 4.4.3 Page: 4-15 Paragraph or Item: USB Port Comment: In the bullet at the top of the page, change "all USB memory devices shall be capable of" to "the ATC Engine Board shall be configured for USB memory devices capable of".</p>	<p>Controller</p> <p>HCT chosen by committee, could be added to acronym list if needed.</p> <p>76. Document: ATC Controller</p> <p>Figure 1-1 has been corrected.</p> <p>77. Document: ATC Controller</p> <p>Modified.</p>
Engine Board	IL DOT	<p>Section: 4.1.1 Page: 4-1 Item: Typos. on lines 8-9 Comment: "THE" should be changed to "the." "Module" should be changed to "module." "manufacturers" should be changed to "manufacturer's."</p> <p>Section: 4.1.2 Page: 4-2 Item: Typos. on line 16 Comment: Spaces are required between "requirementsdetailed" and between "thisstandard."</p>	<p>Typos corrected.</p>
Engine Board	Econolite	<p>Document: ATC Controller Section: 4.1.1 Engine Board Page: 4-1 Paragraph: Line 8</p>	<p>Document: ATC Controller Section: 4.1.1 Engine Board</p>

	<p>Comment: "THE" should be "the".</p> <p>Document: ATC Controller Section: 4.1.1 Engine Board Page: 4-1 Paragraph: 29 Comment: The implications of the "Guidance" sections should be defined somewhere in the standard. It needs to be clear that the "Guidance" statements are informational only and are not requirements.</p> <p>Document: ATC Controller Section: 4.1.2 Host Module Page: 4-2 Paragraph 2 - Line 16 Comment: There are some typo's. "requirementdetailed" "thisstandard"</p> <p>Document: ATC Controller Section: 4.2.1 Board Dimensions and Mechanical Requirements Page: 4-2 Paragraph Line 34-36 Comment: The last sentence of the second paragraph of the section leaves hardware needed to mount the Engine Board to the Host Module open. As the Engine Board and Host Module could be from different manufacturers this could result in some interchangeability problems. This could be addressed by standardizing the mounting hardware that the Host Module should use to secure the Engine Board.</p> <p>Document: ATC Controller Section: 4.2.2 Connector Pin out and Signal Names Page: 4-4 Paragraph: Line 22-23 Comment: A statement such as "or equivalent" should be inserted after the Hirose connector part number shown for the Engine Board and Host Module to clarify that other connectors are acceptable. Gold plating requirements for the pins of the connector should also be included in the standard; either in this section or added to Section 9 to insure that adequate connections are</p>	<p>Page: 4-1 Paragraph: Line 8 Corrected.</p> <p>Document: ATC Controller Section: 4.1.1 Engine Board Page: 4-1 Paragraph: 29 Could be addressed in Glossary.</p> <p>Document: ATC Controller Section: 4.1.2 Host Module Page: 4-2 Paragraph 2 - Line 16 Typos corrected.</p> <p>Document: ATC Controller Section: 4.2.1 Board Dimensions and Mechanical Requirements Page: 4-2 Paragraph Line 34-36 Changed.</p> <p>Document: ATC</p>
--	---	--

	<p>provided.</p> <p>Document: ATC Controller Section: 4.2.3 Environmental Requirements Page: 4-6 Paragraph: Line 6 and Line 9 Comment: The first sentence of the section should read as “Engine Boards shall meet...”. It is also suggested that that the statement in the third sentence of this section stating “...Engine Board mounted in a Host Module” be changed to “...Engine Board mounted to a Host Module.” The standard should also be checked for the consistent use of Host Module. In some cases the reference is Host module, other cases it is host module, etc.</p> <p>Document: ATC Controller Section: 4.3.2 Startup Considerations Page: 4-6 Paragraph: Line 29 Comment: the time period 4.5s should be stated as 4.5 second to avoid confusion.</p> <p>Document: ATC Controller Section: 4.3.4 Real-Time Clock (RTC) Page: 4-7 Paragraph: Line 35-36 Comment: Per the current wording of this section, the RTC accuracy may be provided entirely by the RTC hardware or may be supported by O/S or API software. This requirement may need to be revised depending on the outcome of the work by the API Working Group on choose POSIX vs LINUX.</p> <p>Document: ATC Controller Section: 4.4.3 Serial Interface Ports Page: 4-14 Paragraph: Line 3 Comment: Should a normative reference for the operation of the Serial Peripheral Interface Port be included or is it felt that this is universally understood?</p> <p>Document: ATC Controller</p>	<p>Controller Section: 4.2.3 Environmental Requirements Page: 4-6 Paragraph: Line 6 and Line 9 Changed.</p> <p>Document: ATC Controller Section: 4.3.2 Startup Considerations Page: 4-6 Paragraph: Line 29 Changed.</p> <p>Document: ATC Controller Section: 4.3.4 Real- Time Clock (RTC) Page: 4-7 Paragraph: Line 35- 36 OK.</p> <p>Document: ATC Controller Section: 4.4.3 Serial Interface Ports Page: 4-14 Paragraph: Line 3 Good question. No</p>
--	--	---

		<p>Section: 4.4.4 Programming/Test Port  Page: 4-15  Paragraph: Line 40  Comment: This section requires a manufacturer specific programming and test port even if it is not needed by the manufacturer. Shouldn't this be up to the manufacturer? It seems the sentence should read "...test port may be provided...".</p>	<p>change at this point.</p> <p>Document: ATC Controller  Section: 4.4.4 Programming/Test Port  Page: 4-15  Paragraph: Line 40  Language has been modified to denote optional usage.</p> <p>Document: ATC Controller  Section: 4.2.1 Board Dimensions and Mechanical Requirements  Page: 4-2  Paragraph Line 34-36  Issue reconsidered. Mounting hardware now specified in Section 4.</p>
Engine Board	Coughlin	<p>4-2 4.1.1 1 "Encapsulate the CPU-specific elements ... into a modular form which will provide a reliable migration path for future performance and obsolescence upgrades." Without establishing an uniform mechanism for testing compliance to the engine board standard, this is going to be virtually impossible. At best, an agency will have to purchase new engine boards from the original manufacturer to ensure that it works.</p> <p>Opinion, no action taken.</p>	See interspersed comments.

	<p>4-6 4.3.2 32 "... which will activate the CPU ACTIVE signal." whereas Table 4-1 uses the term "CPU_ACTIVE" (note underscore). Suggest using the latter for consistency.</p> <p>Modified as requested.</p> <p>4-7 4.3.3 15 "... without being corrupted by the power fail conditions specified in Section 8.10." This section describes test procedures, not power interruption operations. Suggest re-wording to refer to some portion of Section 4.4.</p> <p>Modified as requested.</p> <p>4-8 4.4.1 20 "... logic-level inputs must be 5 V-tolerant." What is "5 V-tolerant"? Suggest deletion of this sentence as definition of "logic-level" in Section 11.3 should be sufficient.</p> <p>Modified as requested.</p> <p>4-8 4.4.1 40 "The Engine Board PCB layout shall be performed in such a manner so as to provide the most reliable and robust power distribution possible ..." How is this subjective feature determined? Suggest re-wording.</p> <p>Modified as requested.</p> <p>4-10 4.4.1 fig 4-3 This should be moved to Section 6.2 and should be shown in more detail with minimum and maximum time and voltage values.</p> <p>Opinion, no action taken.</p> <p>4-11 4.4.2 32 "... logic-level between VPRIMARY and GROUND." If "GROUND" is connected to "DC GND1", where is this stated?</p> <p>Response: in Section 7.4.3.</p> <p>4-11 4.4.3 40 "All interface pins shall operate at HCT logic levels." This is redundant as per</p>	
--	--	--

		<p>Section 11.3. Suggest "All interface pins shall be logic-level."</p> <p>Modified as requested.</p> <p>4-16 4.4.4 1 "... all mating PROG_TEST pins on normal ATC Controller hosts shall be no-connects." What is a "normal ATC"? Suggest the term "production units".</p> <p>Modified as requested.</p> <p>4-16 4.4.5 21 "A typical use for this signal is to drive a front-panel 'active' or 'health' LED." Section 6.1.1.2 uses the term "CPU ACTIVE LED Indicator and Section 6.3.1.4 uses the term "LED for ... "ACTIVE" indication". Suggest re-wording for consistency.</p> <p>No action taken in Section 4.</p>	
Comm Interface	IL DOT	<p>Section: 5.3.2.3 Page: 5-11 Item: Typos. on lines 40-41 Comment: The paragraph on these lines is in a different type font. Also, there needs to be a period at the end of the sentence.</p> <p>Section: 5.3.2.3.1 Page: 5-12 Item: Punctuation on line 31 Comment: The word "it's" should instead be "its."</p> <p>Section: 5.3.2.8 Page: 5-17 Item: Typo. on line 4 Comment: Change the word "site" to "sight."</p>	Accepted and corrected.
Comm Interface	Econolite	<p>Document: ATC Controller Section: 5 Communications Page: 5-1 and others</p>	Comment: There are a number of places in section

	<p>Paragraph: Various  Comment: There are a number of places in section 5 that refer to the standard as a specification. These should be changed to standard.</p> <p>Document: ATC Controller  Section: 5.2.3 Mechanical Field Connections  Page: 5-5 and others  Paragraph: Various  Comment: This section refers to "D" connectors in a number of locations. This connector type is not adequately defined in this section nor in section 9. Text should be added in this section or section 9 that standardizes the minimum requirement for D subminiature connectors and latching method (jack screw, latch block, etc.). See paragraph 3.3.1.1 of NEMA TS-2 as an example of the type of text that should be included.</p> <p>Document: ATC Controller  Section: 5.2.3.2.2 EIA-485 Port for Synchronous Operation  Page: 5-6  Paragraph: Line 22-37  Comment: The pin out defined in this sections does not agree with that of TS-2 and could create a compatibility problem. Reference NEMA TS-2 3.3.1.1.</p> <p>Document: ATC Controller  Section: 5.2.3.6 Single Mode Fiber Connections  Page: 5-8  Paragraph: Line 14  Comment: This section allows the use of FC or ST fiber optic connectors. This implies a potential compatibility problem in that one vendor could provide FC while another ST with both being able to say they comply with the standard. The 2070-6D standard included at the end of section 5 requires FC connectors. As such, shouldn't this section limit the connector to the FC type?</p> <p>Document: ATC Controller  Section: 5.2.3.10 Ethernet Connections  Page: 5-8</p>	<p>5 that refer to the standard as a specification. These should be changed to standard.</p> <p>Accepted and revised</p> <p>"D" connector not defined.</p> <p>Agree, will be added to Section 9.</p> <p>The pin out defined in this sections does not agree with that of TS-2 and could create a compatibility problem. Reference NEMA TS-2 3.3.1.1.</p> <p>This comment surfaced in the 2070 ATC comment period. I recall the pinout remained as</p>
--	--	---

	<p>Paragraph: Line 29  Comment: The minimum requirements for the RJ-45 modular connector are not covered in the standard. They should be added here or in section 9.</p> <p>Document: ATC Controller  Section: 5.3.1.1 EIA-485 Signals  Page: 5-9  Paragraph: Line 11 and 13  Comment: For consistency shouldn't the term DATA and /DATA be DATA+ and DATA-?</p> <p>Document: ATC Controller  Section: 5.3.1.1 EIA-485 Signals  Page: 5-9  Paragraph: Line 17  Comment: It is not clear what the statement "Please refer to the Communications Section for information on EIA-485 terminations" refers to as this section covers terminations.</p> <p>Document: ATC Controller  Section: 5.3.1.3  Page: 5-9  Paragraph: Line 26-29  Comment: This section requires +12 VDC to be referenced to DCGND1 and DCGND2. The next section, 5.3.1.4, then states that +12 VDC is to be isolated.</p> <p>Document: ATC Controller  Section: 5.3.2  Page: 5-10 and others  Paragraph: Line 36 and others  Comment: Various references in this section under the heading of "Specifications" use the wording "Please refer to xxx specification for more detailed information..." As this is a standard these statements should be written as requirements using a "shall" statement; such as: The electrical specifications and signal definition shall conform to the requirements of EIA-574.</p>	<p>shown for several reasons:</p> <ol style="list-style-type: none"> <li>1. The pinout shown matches the 2070-7B, that is now successfully used for NEMA TS-2 Port 1 connection to the BIU and MMU. We have heard of no complaints regarding cable mismatches.</li> <li>2. Pin 8 is logic ground on TS-2, but not used here, so that does not present a compatibility problem.</li> <li>3. Pin 10 is logic ground here, but grounded in TS-2 "When it is desirable" to disable the port. So, grounding a grounded pin causes no compatibility</li> </ol>
--	---	--

		<p>Document: ATC Controller  Section: 5.3.2.4 Dial Up Line Modem  Page: 5-14  Paragraph: Line 43  Comment: The minimum requirements for the RJ-11 modular connector are not covered in the standard. They should be added here or in section 9.</p> <p>Document: ATC Controller  Section: 5.3.2.5 Single Mode Fiber  Page: 5-15  Paragraph: Line 9  Comment: The statement "... Amplitude modulation (AM) is employed..." should be changed to "...Amplitude modulation shall be employed...". Also the Data Rate requirement of 100K bps should be a minimum data rate.</p> <p>Document: ATC Controller  Section: 5.3.2.6 Multi Mode Fiber  Page: 5-15  Paragraph: Line 42  Comment: The statement "... Amplitude modulation (AM) is employed..." should be changed to "...Amplitude modulation shall be employed...". Also the Data Rate requirement of 100K bps should be a minimum data rate.</p> <p>Document: ATC Controller  Section: 5.3.2.7 Wide Area Radio  Page: 5-16  Paragraph: Line 18-46  Comment: The requirements in this section are not sufficient to insure the interchangeability of spread spectrum radios between manufacturers. Unless there is a more detailed set of requirements this section should be removed from the standard.</p> <p>Document: ATC Controller  Section: 5.3.2.8 Infrared</p>	<p>problems. The "when is is desirable" statement of TS-2 is ambiguous, such that some NEMA controller vendors do not desire to do it at all. Here, we interpret that it is not desirable to disable the port this way, so we do not view this as violating the TS-2 standard. It is not desirable to run this 5V signal out to door contacts to disable the MMU when the door is opened, as some agencies do. We understand the NEMA intent is to ground this pin within the connector shell, to disable the port when the cable is unplugged, but users do not</p>
--	--	---	--

		<p>Page: 5-17  Paragraph: Line 15  Comment: The last line of this paragraph should state "...located within approximately six feet of the ATC."</p> <p>Document: ATC Controller  Section: 5.3.2.8 Infrared  Page: 5-17  Paragraph: Line 23  Comment: We need to include a normative reference something that ties down the requirements of the IrDA physical layer implementation.</p> <p>Document: ATC Controller  Section: 5.3.2.9 Ethernet  Page 5-17  Paragraph: Line 32  Comment: This section refers to signal names of NETWORK 1-4. It is not clear where these signals originate. They do not come from the Engine Board nor are they coming from one of the defined ports of Hub 1 or 2 that would be part of the Host Module.</p> <p>Also, why is this interface included when there is already multiple Ethernet ports provided (via Hub 1) for network communications?</p>	<p>follow the intent. A 24 VDC FIO connector "D" input to the application would be a much more desirable signal to ground when the port is to be disabled. Also, the 2070 motherboard had no means to feed this disable signal back to the processor, so adding it now would create about as much confusion.</p> <p>4. Pin 12 placing earth ground microscopically close to logic circuitry is a sin for UL, VDE and other safety standards. Noise picked up on comm shields is supposed to be scrubbed to a single point cabinet ground,</p>
--	--	--	---

			<p>not looped through our critical electronic boards, per NEMA. I know of many cases where noise problems were eliminated by the cutting shields off of this pin, and the other NEMA comm connectors, and then reconnecting all of the cabinet shields to a single earth ground.</p> <p>This section allows the use of FC or ST fiber optic connectors. The 2070-6D uses FC connectors.</p> <p>True, but we also found 2070 ATC SM fiber modules that used ST connectors.</p> <p>Remember, we</p>
--	--	--	---

			<p>included the 2070-6D as an example of one module that is compliant to the standard. We are not favoring it over others. FC to ST SM fiber patch cables are pretty common, and most fiber installations require patch panels anyway. Why not let the customer choose?</p> <p>No changes.</p> <p>RJ-45 connector standard.</p> <p>Accepted, will be added to Section 9.</p> <p>Data + and Data -</p> <p>Accepted and changed</p> <p>"Please refer to the</p>
--	--	--	---

			<p>Communications Section for information on EIA-485 terminations”</p> <p>Accepted and removed.</p> <p>This section requires +12 VDC to be referenced to DCGND1 and DCGND2. The next section, 5.3.1.4, then states that +12 VDC is to be isolated.</p> <p>Accepted and corrected.</p> <p>Comment: Various references in this section under the heading of “Specifications” use the wording “Please ...</p> <p>Accepted and corrected.</p>
--	--	--	---

			<p>Minimum requirements for RJ-11 will be added to Section 9</p> <p>Accepted</p> <p>The statement "... Amplitude modulation (AM) is employed..." should be changed to "...Amplitude modulation shall be employed...". Also the Data Rate requirement of 100K bps should be a minimum data rate.</p> <p>Accepted and corrected.</p> <p>Section: 5.3.2.7 Wide Area Radio Page: 5-16 Paragraph: Line 18-46 Comment: The requirements in this section are</p>
--	--	--	---

			<p>not sufficient to insure the interchangeability of spread spectrum radios between manufacturers.</p> <p>We are not intending to force manufacturers to standardize hopping vs direct sequence, etc. We are intending to use license free 902-928 Part 15 band.</p> <p>...six feet of the ATC.”</p> <p>Accepted and changed.</p> <p>IrDA Physical layer implementation.</p> <p>Accepted.</p> <p>This section refers to signal names of NETWORK 1-4. It</p>
--	--	--	--

			<p>is not clear where these signals originate.</p> <p>These signals reference the 96 pin connector of 5.2.2</p> <p>Also, why is this interface included when there is already multiple Ethernet ports provided (via Hub 1) for network communications?</p> <p>This simply reserves pins for an Ethernet connection to the host board.</p>
Comm Interface	Rstarr/MN	<p>78. Document: ATC Controller Section: 5.2.2 Page: 5-4 Paragraph or Item: ATC Communications Connector Mechanical Pin Assignments Comment: SP7, also sometimes called SP8, is missing from the pinout, but Figure 1-1 shows it should also be feeding the modem devices, and therefore should be on the communications interface connector.</p> <p>79. Document: ATC Controller Section: 5.2.2 Page: 5-4</p>	<p>78. Corrected on Fig 1-1</p> <p>79. Figure 1-1 corrected.</p> <p>Also -</p> <p>The statement explaining why SP6 is not</p>

	<p>Paragraph or Item: ATC Communications Connector Mechanical Pin Assignments  Comment: SP6 is present in the pinout, but Figure 1-1 shows it dedicated to feeding the front panel, and therefore would not need to be on the Communications Interface connector. Also, the Guidance in 7.4 says that since SP6 feeds the front panel, an integral part of the ATC, that SP6 does not need to be electrically isolated. Therefore, it should not be present on the Communications Interface connector.</p> <p>80. Document: ATC Controller  Section: 5.2.2  Page: 5-4  Paragraph or Item: ATC Communications Connector Mechanical Pin Assignments  Comment: SP3TXC1+ is missing the "C".</p> <p>81. Document: ATC Controller  Section: 5.2.2  Page: 5-4  Paragraph or Item: ATC Communications Connector Mechanical Pin Assignments  Comment: SP3TXC1- is missing the "-".</p> <p>82. Document: ATC Controller  Section: 5.2.2  Page: 5-4  Paragraph or Item: ATC Communications Connector Mechanical Pin Assignments  Comment: The serial port connections come out of the engine board as logic level single ended signals. Apparently in the ATC host module they get converted to balanced 485 differential signals and put on the Communications Interface connector. Then in some Communications Interface modules they get converted to bipolar EIA-574 signals. Rather than converting the signal format twice, just bring EIA-574 or 485 directly out of the engine board. That way in common Communication Interface configurations the signal will not need to be converted at all, and in the rest of the configurations it will only need to be converted once. Each conversion is one more thing that can break.</p> <p>83. Document: ATC Controller  Section: 5.2.2</p>	<p>electrically isolated to a local front panel is unrelated to the appearance of SP6 on this connector. For example, if a remote front panel is desired some distance away, SP6 could be isolated on this board and sent via 485.</p> <p>SP3TXC1- is missing the "-".</p> <p>Accepted and corrected.</p> <p>82. Single-ended vs differential for Engine Board low speed comm signals was previously discussed and investigated extensively.</p> <p>No changes.</p> <p>83. NETWK lines</p>
--	--	--

		<p>Page: 5-4  Paragraph or Item: ATC Communications Connector Mechanical Pin Assignments  Comment: Clarify what the NETWK1-4 pins are. I assume these 4 signals represent the + and - differential pairs for the transmit and receive of one of the ports coming out of one of the 2 hubs within the ATC. Identify which hub and port they come from within the ATC and which pin is which wire of the 10Base-T connection.</p> <p>84. Document: ATC Controller  Section: 5.2.3.3  Page: 5-6  Paragraph or Item: Private Line Modulator/Demodulator (Modem) Connections  Comment: Add the word "Internal" to the beginning of the title to match with the following subsections.</p> <p>85. Document: ATC Controller  Section: 5.2.3.3.1  Page: 5-7  Paragraph or Item: Internal and External Modem Connections  Comment: Change the title to "Internal Private Line Modem and EIA 574 Connections"</p> <p>86. Document: ATC Controller  Section: 5.2.3.4  Page: 5-7  Paragraph or Item: Internal Only Modem Connections  Comment: This should be numbered as 5.2.3.3.2, since 5.2.3.3 says there are 2 possible connections and this is the second one of those 2.</p> <p>87. Document: ATC Controller  Section: 5.2.3.4  Page: 5-7  Paragraph or Item: Internal Only Modem Connections  Comment: Change the title to "Internal Private Line Modem Only Connections"</p> <p>88. Document: ATC Controller</p>	<p>are simply reserved pins that have proper grounding, separation and PC board trace characteristic impedance to handle Ethernet. This standard does not dictate their use.</p> <p>85. Accepted and changed.</p> <p>86. Accepted and changed</p> <p>87. Accepted and changed.</p> <p>88. Accepted and changed</p> <p>89. Accepted and changed.</p> <p>90. Agreed and changed</p> <p>91. Previously discussed</p> <p>92. Accepted</p>
--	--	---	---

		<p>Section: 5.2.3.5 Page: 5-7 Paragraph or Item: Dial-Up Line Modem Connections Comment: Add the word "Internal" in front of the title.</p> <p>89. Document: ATC Controller Section: 5.2.3.5 Page: 5-7 Paragraph or Item: Dial-Up Line Modem Connections Comment: The first word should be "Dial-up", not "Private".</p> <p>90. Document: ATC Controller Section: 5.2.3.5 Page: 5-7 and 5-8 Paragraph or Item: Dial-Up Line Modem Connections Comment: This defines a 9-pin connector (that could get confused with other 9-pin connectors), but 5.2.3.4 says it shall be an RJ-11 connector, which would be better.</p> <p>91. Document: ATC Controller Section: 5.2.3.6 Page: 5-8 Paragraph or Item: Single Mode Fiber Connections Comment: Change FC connector to FC/PC. This is a better connector with less backscatter.</p> <p>92. Document: ATC Controller Section: 5.2.3.6 Page: 5-8 Paragraph or Item: Single Mode Fiber Connections Comment: Delete the words "laser" and "PIN diode". This section on connectors should not be specifying the type of transmitter or receiver.</p> <p>93. Document: ATC Controller Section: 5.2.3.6, 5.2.3.7, 5.3.2.5, and 5.3.2.6 Page: 5-8 and 5-15</p>	<p>93. Don't agree that this must be specified, as long as the specified connector type is used.</p> <p>94. Accepted and changed.</p> <p>95. Again, this standard does not dictate the use of the front panel connectors. The module vendor must describe the use in detail, including whether a crossover is used, which hub port is connected, etc. The host board function is not specified, other than maximum size.</p> <p>96. Accepted and changed</p> <p>97. Accepted and changed</p>
--	--	--	--

	<p>Paragraph or Item: Single Mode and Multi Mode Fiber Connections  Comment: Clarify if there are separate connectors for transmit and receive, or whether the transmit and receive are on a single connector. It can work either way but must be specified.</p> <p>94. Document: ATC Controller  Section: 5.2.3.7  Page: 5-8  Paragraph or Item: Multi Mode Fiber Connections  Comment: Delete the words "LED" and "phototransistor". This section on connectors should not be specifying the type of transmitter or receiver.</p> <p>95. Document: ATC Controller  Section: 5.2.3.10 and 7.3  Page: 5-8 and 7-23 thru 7-24  Paragraph or Item: Ethernet Connections  Comment: Add a clear overview of the direction of all the ethernet ports. Figure 7-3 and the discussion on page 7-24 could be this overview, but neither mentions the Communication Interface connector. The ethernet on the engine board has Transmit being data out from the engine board, which is normal. This goes into an internal hub. The ethernet connection described in 5.2.3.10, however, is a connection going into the internal hub. If it is intended to plug a computer into this port, the Transmit should be data coming out of the computer into the internal hub, opposite of what is shown. Otherwise you need a crossover cable, which shouldn't be a requirement when plugging a computer into a hub. It is not clear which ethernet port from the internal hubs is to be brought to this Communications Interface, and the discussion on page 7-24 does not clarify this. If the ethernet Communications Interface is an uplink to an external network hub, then this would be correct and would be an uplink from the internal hub.</p> <p>96. Document: ATC Controller  Section: 5.3.1.1  Page: 5-9  Paragraph or Item: EIA-485 Signals  Comment: The bullets talk about DATA and /DATA, but in 5.2.2 none of the lines are</p>	<p>98. Accepted and changed.</p>
--	--	----------------------------------

		<p>labeled as such. I assume this means the + and - lines in 5.2.2, but it would be best to use consistent labels throughout this ATC standard.</p> <p>97. Document: ATC Controller Section: 5.3.1.3 Page: 5-9 Paragraph or Item: Power Signals Comment: The first sentence shows DCGND1 as being the common reference for +12VDC. The second sentence shows DCGND2 also being the common reference for +12VDC. 5.3.1.4 says these must be isolated from each other. Are these 2 different +12 VDC sources? If so, label them with different names. Is one of them the +12VDC ISO discussed under 6.2.6? If so, label it as such.</p> <p>98. Document: ATC Controller Section: 5.3.1.4 Page: 5-10 Paragraph or Item: Electrical Isolation Comment: The last sentence of the section indicates that Wide Area Radio is inherently isolated via the non-conductive radio frequency media. However, the connection to this radio Communications Interface is a coax cable to an antenna, which is very susceptible to bringing electrical surges into the equipment. Require the appropriate provisions for isolating the radio antenna input from the ATC.</p> <p>99. Document: ATC Controller Section: 5.3.2.1 Page: 5-10 Paragraph or Item: EIA-574 Comment: The description paragraph indicates that the EIA-574 is to be bipolar simplex, however, the table beneath the paragraph shows both transmit and receive, which is not simplex. And since the transmit and receive are different pins, why would it not be full duplex?</p> <p>100. Document: ATC Controller Section: 5.3.2.2 Page: 5-11</p>	
--	--	--	--

		<p>Paragraph or Item: EIA-485 Comment: In the table, it shows ON with a meaning related to DATA and /DATA. Referring to 5.2.3.2.1, this really should be in reference to TXD+ with relationship to TXD-, and RXD+ with RXD-. As it is shown, both indicators would be showing the same thing.</p> <p>101. Document: ATC Controller Section: 5.3.2.2 Page: 5-11 Paragraph or Item: EIA-485 Comment: The table shows the indications when one wire is at 0V and the other at a positive voltage. However, the 485 is a balanced differential signal, and so the relevant voltage is the one with respect to the other, and neither of them are directly referenced to a common voltage such that it could be said to be at 0V. Update the table to correctly describe the 485 signals.</p> <p>102. Document: ATC Controller Section: 5.3.2.3 Page: 5-11 Paragraph or Item: Private Line Modem Comment: Some modems have different power levels if you connect to your own privately owned cable versus a leased line from the phone company (not dial-up, but leased). If the power levels shown in the subsections of this section are not allowable on a leased line, there should be a requirement allowing choosing the lower power level that would allow use on a leased line.</p> <p>103. Document: ATC Controller Section: 5.3.2.3 Page: 5-11 Paragraph or Item: Private Line Modem Comment: In the last phrase of the 1st paragraph, the indication is that this is not connected to a phone company. Is the real intent that it is not a dial-up line? Would a leased direct connect line from the phone company (not dial-up) work with this modem?</p>	
--	--	--	--

	<p>104. Document: ATC Controller Section: 5.3.2.3 Page: 5-11 Paragraph or Item: Private Line Modem Comment: In the 4th paragraph, delete the first "on the front panel". This is not a function that will be routinely utilized and could be provided in a number of ways that would free up front panel space and still provide adequate useability.</p> <p>105. Document: ATC Controller Section: 5.3.2.3 Page: 5-12 Paragraph or Item: Private Line Modem Comment: In the 2nd paragraph on the page, delete the words "mounted internally". It would not be wrong if it were on the front panel, although it would not need to be on the front panel.</p> <p>106. Document: ATC Controller Section: 5.3.2.3 Page: 5-12 Paragraph or Item: Private Line Modem Comment: In the 2nd paragraph on the page, replace "if the modem is installed in a FULL duplex central office, which continuously transmit to remote ATCs" with "for situations where the transmitter is expected to continuously transmit under normal operations". The currently cited case is only one possible situation where these conditions would apply.</p> <p>107. Document: ATC Controller Section: 5.3.2.4 Page: 5-14 Paragraph or Item: Dial Up Line Modem Comment: The bottom line on the page indicates an RJ-11 connector on the front panel, while 5.2.3.5 calls for a 9-pin connector. The RJ-11 is better.</p> <p>108. Document: ATC Controller Section: 5.2.3.5 and 5.3.2.6</p>	
--	---	--

	<p>Page: 5-15 and 5-16 Paragraph or Item: Single Mode Fiber and Multi Mode Fiber Comment: Do not limit the bit rate to the single rate as shown. Most of the other interfaces allow multiple bit rates.</p> <p>109. Document: ATC Controller Section: 5.3.2.9 Page: 5-17 Paragraph or Item: Ethernet Comment: It may be helpful for debugging to have a separate transmit and receive light rather than one combined one.</p> <p>110. Document: ATC Controller Section: 5.4 Page: 5-18 Paragraph or Item: Communications Interface Versions Comment: Remove the statements "The following is a list of the existing Communications Interface Versions" and "As new versions are defined, this list will expand". These are not appropriate statements in the ATC standard. If these versions are defined in some other standard then just indicate that versions of the Communications Interface are defined in that other standard. If new versions are invented before this ATC standard is revised, the statements would not be true.</p> <p>111. Document: ATC Controller Section: 5.4 Page: 5-18 Paragraph or Item: Communications Interface Versions Comment: Remove the statement regarding 3 possible design methods. How the vendor chooses to design and identify the boards should not be constrained by this standard as long as the boards plug into the connector and provide the external interfaces defined.</p> <p>112. Document: ATC Controller Section: 5.4 Page: 5-18</p>	
--	---	--

		<p>Paragraph or Item: Communications Interface Versions  Comment: Remove the statements referring to the joint ATC standard for specifications for 4 of the versions, but indicating that 1 of the versions is not defined in the joint ATC standard but is defined below. This is the joint ATC standard. If what is meant is the CALTRANS TEES, then correct the reference.</p> <p>113. Document: ATC Controller  Section: 5.4  Page: 5-18  Paragraph or Item: Communications Interface Versions  Comment: Instead of defining the 2070-6D Internal Fiber Modem here in this document, instead define it in whatever document defines the other versions. By the name of it, the 2070 specification may be the best place to define it.</p> <p>114. Document: ATC Controller  Section: 5.4  Page: 5-18 thru 5-22  Paragraph or Item: Communications Interface Versions  Comment: Use "shall" type wording for this specification. The "is" type wording is more like a product brochure and can result in vagueness.</p> <p>115. Document: ATC Controller  Section: 5.4  Page: 5-19  Paragraph or Item: Communications Interface Versions  Comment: On the line numbered line 8, remove the reference to the A2 slot of the ATC 2070. The ATC spec does not define a slot A2, and it is not necessarily a 2070.</p>	
Comm Interface	Coughlin	<p>5-2 5.1.1 14 "1. ATC shall provide a minimum of one communications interface card slot." This sentence applies to the unit requirements, not the communications module connector interface standard.</p> <p>5-2 5.1.1 18 "4. ... providing the field connectors and pin assignments conform to this specification." This sentence applies to the unit requirements, not the communications module connector interface standard.</p>	<p>Three comments on page 5-2.</p> <p>We agree that interchangeability control is really not part of the</p>

		<p>5-2 5.1.1 20 This sentence is redundant with sentence 1. Suggest deletion of this sentence.</p> <p>5-4 5.2.2 Almost all of the signal designations for the Communications Interface Connector do not match with those used in Table 4-1. Suggest using the latter designations with the appropriate extension for differential signals.</p> <p>5-6 5.2.3.2.2 Most of the signal designations do not match with the terms defined in Section 11.3. Suggest using the latter for consistency.</p> <p>5-7 5.2.3.3.1 11 Where is "Low Power +5 VDC Source" defined?</p> <p>5-7 5.2.3.4 This pinout was identified at the San Diego meeting as being a NEMA standard; if so, it should be referenced as such.</p> <p>5-8 5.2.3.5 This pinout was identified at the San Diego meeting as being a NEMA standard; if so, it should be referenced as such.</p> <p>5-9 5.3.1.1 4 Are "NETWORK1 - NETWORK4" the same as "NETWK1" through "NETWK4" as shown in Section 5.2.2? To which CPU Module ethernet port / hub are they assigned?</p> <p>5-9 5.3.1.1 11 "... connected from DATA to /DATA ..." Where is this terminology defined?</p> <p>5-9 5.3.1.3 26 "DCGND1 shall be the common reference for +5 VDC, +12 VDC, -12 VDC and all signals. DCGND2 shall be the common reference for +12 VDC." This is contradictory. Suggest using unambiguous and unique designations for all signals, especially power.</p> <p>5-9 5.3.1.4 32 "DCGND2 and +12 VDC as a group shall be electrically isolated from all other signals and power sources as a group, maintaining the isolation specifications of the Environmental Section." Suggest re-wording to refer to Section 9, "Performance and Material Requirements", specifically Section 9.1.4, "Electrical</p>	<p>communications interface standard, and really should be in the first section. However, we will leave it here as guidance. Every discussion of this section in every meeting ended up with some confusion regarding this subject. Vendors that concentrate on modem design will most likely read this section and may miss the earlier details.</p> <p>5-4 5.2.2</p> <p>Actually, the signals in 5.2.2 are intended to have different signal names, as they are differential, while the Engine Board signals are 5V HCMOS. We didn't want to</p>
--	--	--	--

		<p>Isolation".</p> <p>5-9 5.3.1.4 34 "Equipemt ground (EG) shall maintain the isolation specifications of the Environmental Section." Suggest re-wording to refer to Section 9, "Performance and Material Requirements", specifically Section 9.1.4, "Electrical Isolation".</p> <p>5-12 5.3.2.3.1 31 "... but it's higher frequency ..." Suggest "... but its higher frequency ..." (note use of possessive pronoun instead of contraction).</p> <p>5-13 5.3.2.3.1 19 The 0-9600 bps modem is not compliant to Bell Standard 202. Suggest re-wording to delete this reference.</p> <p>5-15 5.3.2.5 30 Where is "dBm" defined?</p> <p>5-17 5.3.2.9 32 Where is "NETWORK1-4" defined?</p>	<p>suggest the Engine Board signals are connected directly to the modem.</p> <p>5-6 5.2.3.2.2</p> <p>A little confused here. 5.2.3.2.2 are signal names, while Section 11.3 is a glossary of acronyms. Not sure how these relate.</p> <p>5-7 5.2.3.3.1 11</p> <p>Agreed and changed</p> <p>5-7 5.2.3.4</p> <p>Agreed and changed</p> <p>Comments for page 5-9:</p> <p>All agreed and described in previous replies.</p>
--	--	--	---

			<p>5-12 5.3.2.3.1 31</p> <p>Agreed and changed</p> <p>5-13 5.3.2.3.1 19</p> <p>Agreed and changed</p> <p>5-15 5.3.2.5 30</p> <p>Agreed and changed</p> <p>5-17 5.3.2.9 32</p> <p>Agreed and changed on previous comment</p>
Phys & User I/F	IL DOT	<p>Section: 6.1.2.2 Page: 6-2 Item: Typo. on line 35 Comment: Add the word "to" before the word "determine."</p> <p>Section: 6.1.4.1.3 Page: 6-4 Item: Typo. on line 29 Comment: Change "0,17" to "0.17."</p> <p>Section: 6.1.4.1.18</p>	<p>Section: 6.1.2.2 Page: 6-2</p> <p>Accepted and changed</p> <p>Section: 6.1.4.1.3 Page: 6-4</p> <p>Accepted and changed</p>

		<p>Page: 6-7  Item: Typo. on line 38  Comment: There should be one period at the end of the sentence, not two.</p>	<p>Section:  6.1.4.1.18  Page: 6-7</p> <p>Accepted and changed</p>
Phys & User I/F	Econolite	<p>Document: ATC Controller  Section: 6.1.2.2 Optional User Interface to the O/S  Page: 6-2  Paragraph: Line 35  Comment: This line should read "...Request Module Status command of the Field I/O module to determine that the ..."</p> <p>Document: ATC Controller  Section: 6.1.4.1.3 Display  Page: 6-4  Paragraph: Line 31  Comment: The reference to "user-defined characters" should be "user defined special characters " to match text of 6.1.4.1.8.</p> <p>Document: ATC Controller  Section: 6.1.4.1.5 Reset  Page: 6-5  Paragraph: Line 15  Comment: The sentence "The string is ESC ..." should be "The string shall be ESC ...".</p> <p>Document: ATC Controller  Section: 6.1.4.1.10 Auto Wrap  Page: 6-6  Paragraph: Line 10-12  Comment: The Auto Wrap requirements of this section preclude the use of displays beyond 40 characters.</p> <p>Document: ATC Controller</p>	<p>Page: 6-2  Paragraph: Line 35</p> <p>Accepted and changed</p> <p>Page: 6-4  Paragraph: Line 31</p> <p>Accepted and changed</p> <p>Page: 6-5  Paragraph: Line 15</p> <p>Accepted and changed</p> <p>Page: 6-6  Paragraph: Line 10-12</p> <p>Accepted, changed to "right-most"</p>

		<p>Section: 6.1.4.1.15 Simultaneous Auto Wrap and AutoScroll. Page 6-7 Paragraph 1 Line 4 Comment: We are questioning the writing of a space character. Will that not change the data in that cell displayed in that cell? Also we would like to suggest that the cursor be positioned to Column 1 of the new row. We are not clear as to what is actually being required here.</p> <p>Document: ATC Controller Section: 6.1.4.18 Command Codes Page: 6-7 Paragraph 9 Line 31 Comment: PY: display – range defines lines (1-4), Does this need to be extended to Line (1-8) for the 8 X 40 display? Shouldn't this section include a reference to Table 6-1?</p> <p>Document: ATC Controller Section: 6.1.4.1.20 Bell Page: 6-8 Paragraph: Line 6 Comment: The minimum requirements for the "electronic bell" should be included in this section or section 9.</p> <p>Document: ATC Controller Section: 6.1.4.6 Data Key Page: 6-10 Paragraph: Line 13 Comment: Are the Data Key part numbers sufficient information to insure compatibility between manufactures. In a standard of this type should the minimum requirements of a key device like this be at least stated in the standard?</p> <p>Document: ATC Controller Section: 6.1.5 User Interface Power Requirements Page: 6-10 Paragraph: Line 19-20</p>	<p>Page 6-7</p> <p>Paragraph 1 Line 4</p> <p>If autoscroll is ON, the characters displayed on the the last line will be overwritten by the characters on the next to the last line, proceeding all the way up the display, until the characters on the first line are written to the second line, the first line is now blank, and the cursor is now positioned at the left of the top line, where it writes a space.</p> <p>Page: 6-7 Paragraph 9 Line 31</p> <p>Accepted and</p>
--	--	---	--

	<p>Comment: The last sentence of this section requires that the maximum current requirements of each User Interface shall be published for each device. Why is this requirement included when there is no interchangeability of this hardware between manufacturers.</p> <p>Document: ATC Controller Section: 6.3.1.2 Weight Page 6-14 Paragraph: Line 33 Comment: Is the weight shown in this section intended to be the maximum of the entire ATC or just the chassis. This should be clarified in the text of this section.</p> <p>Document: ATC Controller Section: 6.3.1.4 Dimension. Page 6-16 Paragraph 2 Lines 10-12 Comment: The Maximum Basic Dimensions are given for the height, depth, and width of the ATC controller. The height is limited to 6.98 inches.</p> <p>Under the Guidance Line 14 on page 6-15 and continuing onto 6-16 Line 1 Quoting NEMA Specification Paragraph 3.2.1 Dimension. " The CU shall be ...", allows for a 12 high controller. Is the ATC standard limiting the height of the rack mount to 6.98 and shelf mounting to 12 inches or does the standard limit the height to 12 inches. If 6.98 is the maximum height then we are limiting the display to the 8X40 only and will not allow large displays to be used if desired by the manufacturer. We have repeatedly asked for a dimension height limit increase. Is it possible to allow a shelf mounted controller to have a higher limit? If this is not addressed you will see various controllers sizes on the market that will be provided that will not meet the standard.</p> <p>The limitation of the maximum controller height to 4U does not take into consideration the large number of NEMA controller users that have been satisfied with controller packaging approaches that allowed larger displays and more convenient spacing of the NEMA interface connectors. I fully agree that the 2070N/LN approach results in a large controller and one that exceeds the maximum</p>	<p>changed</p> <p>Page: 6-8 Paragraph: Line 6</p> <p>Accepted and changed.</p> <p>Section: 6.1.4.6 Data Key Page: 6-10 Paragraph: Line 13</p> <p>Specifying exact vendor part number "or equal" is acceptable here.</p> <p>Page: 6-10 Paragraph: Line 19-20</p> <p>I recall we wanted the current specified to determine cable voltage drop and extension cable type, if the front panel is mounted remotely. I added that note.</p>
--	--	--

		<p>height allowed by the TS2 standard. If users are going to be polled about size then we should also be polling the majority of the market that is using NEMA controllers.</p> <p>The guidance in the draft standard implies that the TS2 Dimensions were taken into consideration. If so, then existing NEMA controller and MMU heights should have been given consideration as most exceed the 4U height allowed by this draft. At a minimum the standard should allow shelf mounted controllers to have a height that is consistent with current acceptable TS2 controller practice and take into consideration that most shelf mounted NEMA controllers reside on the same shelf as the MMU which has a height of 10.5 inches or 6U.</p> <p>It is interesting to note that the current wording in the draft standard will make any existing 2070N/LN controllers non-conforming to the ATC Controller standard as the 2070N/LN exceeds both the height and width restriction (it does not fit in a rack due to fasteners used to attached the 2070-8 module). With all the arguments about compatibility with exiting deployments why isn't this an issue?</p> <p>Document: ATC Controller  Section: 6.3.1.4 Dimension  Page 6-16  Paragraph 3 Line 13 - Note A  Comment: This note defines minimum and optional components to be on front panel. AS this is a requirement the text should be presented as a requirement not just a Note. The minimum requirements should be clarified to insure the reader is not confused as to what is and what is not required. It may be helpful to indicate which items are optional.</p> <p>Document: ATC Controller  Section: 6.3.1.4 Dimension  Page 6-16  Paragraph 6 Line 29 - Note B  Comment: See previous comment.</p>	<p>Page 6-14  Paragraph: Line 33</p> <p>Agreed and changed</p> <p>Page 6-16  Paragraph 2 Lines 10-12  Comment: The Maximum Basic Dimensions are given for the height, depth, and width of the ATC controller. The height is limited to 6.98 inches.</p> <p>"Under the Guidance Line 14 on page 6-15 and continuing onto 6-16 Line 1 Quoting NEMA Specification Paragraph 3.2.1 Dimension. " The CU shall be ...", allows for a 12 high controller. Is</p>
--	--	---	---

			<p>the ATC standard limiting the height of the rack mount to 6.98 and shelf mounting to 12 inches or does the standard limit the height to 12 inches. If 6.98 is the maximum height then we are limiting the display to the 8X40 only and will not allow large displays to be used if desired by the manufacturer. We have repeatedly asked for a dimension height limit increase. Is it possible to allow a shelf mounted controller to have a higher limit? If this is not addressed you will see various controllers sizes on the market that will be</p>
--	--	--	--

			<p>provided that will not meet the standard.”</p> <p>We are requiring 6.98 maximum height for rack and shelf mount. We quoted the TS-2 standard simply to demonstrate that we are not violating the TS-2 standard. We also quoted the TEES and the Joint ATC standard. We chose the maximum size conforming to all SDOs represented on the Joint Committee.</p> <p>“It is interesting to note that the current wording in the draft standard will make any existing 2070N/LN</p>
--	--	--	--

			<p>controllers non-conforming to the ATC Controller standard as the 2070N/LN exceeds both the height and width restriction (it does not fit in a rack due to fasteners used to attached the 2070-8 module). With all the arguments about compatibility with exiting deployments why isn't this an issue?"</p> <p>It is an issue. According to almost every user it is way too big. We moved to the next smaller size conforming to all SDOs represented on the Joint Committee.</p> <p>"The guidance in the draft</p>
--	--	--	---

			<p>standard implies that the TS2 Dimensions were taken into consideration. If so, then existing NEMA controller and MMU heights should have been given consideration as most exceed the 4U height allowed by this draft. At a minimum the standard should allow shelf mounted controllers to have a height that is consistent with current acceptable TS2 controller practice and take into consideration that most shelf mounted NEMA controllers reside on the same shelf as the MMU which has a height of 10.5 inches or 6U."</p>
--	--	--	--

			<p>The guidance states that the ATC size does not violate the TS2 standard; it does not grant vendors the maximum TS2 size, which violates other standards. NEMA users are limited for shelf space, meaning the top of a shorter controller provides convenient space for communications boxes, while the tall MMU is not usable for such. This is user opinion, not the opinion of the contractor.</p> <p>"The limitation of the maximum controller height to 4U does not take into consideration the large number of NEMA controller</p>
--	--	--	--

			<p>users that have been satisfied with controller packaging approaches that allowed larger displays and more convenient spacing of the NEMA interface connectors. I fully agree that the 2070N/LN approach results in a large controller and one that exceeds the maximum height allowed by the TS2 standard. If users are going to be polled about size then we should also be polling the majority of the market that is using NEMA controllers.”</p> <p>We are not specifying a TS-2 special purpose traffic signal controller here,</p>
--	--	--	---

			<p>and nothing in this standard requires the redesign of any existing NEMA controller. NEMA TS-2 controllers will go forward in their present sizes and shapes forever. The ATC, on the other hand, will most likely be performing advanced tasks using communications, video, etc that take up increasingly more space. The Joint Committee users, especially the NEMA users with limited shelf space, want a smaller ATC. For an advanced application, an existing NEMA controller is removed and replaced by an ATC, plus more</p>
--	--	--	---

			<p>equipment. "More equipment" is very often set on top of the ATC.</p> <p>Again, we will defer to the ATC users to suggest a different size. But, so far, no ATC user has asked for a larger display or larger chassis in any of the posts on this website, or in any of our working group meetings.</p> <p>Page 6-16 Paragraph 3 Line 13</p> <p>Agree and changed.</p>
Phys & User I/F	Rstarr/MN	<p>116. Document: ATC Controller Section: 6.1 Page: 6-1 Paragraph or Item: User Interface General Description Comment: In the first bullet change "ATC" to "2070". This is the spec for the ATC, and so the statement does not make sense as is.</p> <p>117. Document: ATC Controller Section: 6.1.1.1 and 6.1.1.2</p>	<p>Page: 6-1 Paragraph or Item: User Interface General</p> <p>Agreed and changed.</p> <p>Section: 6.1.1.1</p>

	<p>Page: 6-2  Paragraph or Item: Minimum User Interface to the Application, to the O/S  Comment: Don't differentiate between interface to the Application versus the O/S. If you connect a computer to the ATC through a serial port, ethernet port, or infrared port you should be able to access both. The keyboard and display should also be able to access both.</p> <p>118. Document: ATC Controller  Section: 6.1.1.1 and 6.1.1.2  Page: 6-2  Paragraph or Item: Minimum User Interface to the Application, to the O/S  Comment: In the first bullet of each of these lists, change EIA 232 to EIA 574 as discussed under the Communications Interface section.</p> <p>119. Document: ATC Controller  Section: 6.1.1.1 and 6.1.1.2  Page: 6-2  Paragraph or Item: Minimum User Interface to the Application, to the O/S  Comment: Make the Data Key, the Ethernet Port, the CPU ACTIVE LED, and the USB Port all optional, since many if not most applications would not need them. As an option they can be used when needed rather than adding cost without benefit to all ATC controllers.</p> <p>120. Document: ATC Controller  Section: 6.1.2.1  Page: 6-2  Paragraph or Item: Optional User Interfaces to the Application  Comment: Option 1 lists the keyboard and display as an optional interface. 6.1.1.1 lists SP6 connector as a required interface. The keyboard and display connect to SP6. Therefore, if you provide the optional keyboard interface, the required SP6 interface is no longer available even though it is required. This also implies that if you have a keyboard you cannot then plug in a laptop to a serial port to interface to the application since the last sentence of 6.1.1 says you cannot have additional interfaces to the application beyond these listed here as required and optional.  Clarify that the required SP6 does not need to be otherwise available if the optional</p>	<p>and 6.1.1.2  Page: 6-2</p> <p>No change.</p> <p>The application and OS are accessed by different means, as shown.</p> <p>Section: 6.1.1.1 and 6.1.1.2  Page: 6-2</p> <p>Accepted and changed.</p> <p>119. Document: ATC Controller  Section: 6.1.1.1 and 6.1.1.2  Page: 6-2</p> <p>Previously decided.</p> <p>No changes</p> <p>120. Document: ATC Controller  Section: 6.1.2.1  Page: 6-2</p> <p>Don't understand</p>
--	--	---

		<p>keyboard and display are provided, and then in the options allow an additional serial port as an option for the user interface to the application in cases when a keyboard and display are provided.</p> <p>121. Document: ATC Controller Section: 6.1.2.1 and 6.1.4.1 Page: 6-2 and 6-4 Paragraph or Item: Optional User Interfaces to the Application and Keyboard, LCD and Bell Operation Comment: In Option 1 of 6.1.2.1 and in 6.1.4.1 and its subsections, change "LCD" to "Display" and "Bell" to "Audible Indicator". Since 6.1.1 prohibits any options other than those listed, calling it an LCD and Bell would prohibit any advances in display technologies and anything more practical than a bell.</p> <p>122. Document: ATC Controller Section: 6.1.2.1 Page: 6-2 Paragraph or Item: Optional User Interfaces to the Application Comment: Option 3 indicates an Ethernet interface to a graphics device, but does not appear to allow an Ethernet or Serial connection to a remote computer as an option for interfacing to the application. Remote access to the application is a fundamental use of the ATC and needs to be added as an option. If the keyboard and display are provided as an option, then SP6 is not available for connecting to a remote computer. 6.1.1 prohibits any user interface to the application that is not listed here, and so this remote application interface needs to be added.</p> <p>123. Document: ATC Controller Section: 6.1.2.2 Page: 6-2 Paragraph or Item: Optional User Interfaces to the O/S Comment: The keyboard and display and the infrared port should be allowed as interfaces to the O/S as they are for interfacing to the application. Killing a hung application and setting the current time and date are examples of O/S user interfaces that should be allowable through the keyboard and display or infrared.</p>	<p>the logic of this comment. If the required SP6 has a display plugged into it, it still exists.</p> <p>121. Document: ATC Controller Section: 6.1.2.1 and 6.1.4.1 Page: 6-2 and 6-4</p> <p>Other display technologies are not prohibited, in fact they are specifically allowed.</p> <p>"Bell" is pretty well described.</p> <p>122. Document: ATC Controller Section: 6.1.2.1 Page: 6-2 Paragraph or Item: Optional User Interfaces to the Application</p> <p>Remote connections are</p>
--	--	--	---

	<p>124. Document: ATC Controller Section: 6.1.2.2 Page: 6-2 Paragraph or Item: Optional User Interfaces to the O/S Comment: Reword item 1. It appears to be saying that it is OK to use SP4 for both the application and the O/S, and it tells what you need to do in order to make that work. However, SP4 is not allowed as the application interface in 6.1.1.1 or 6.1.2.1. 6.1.1 says that if it is not listed there it is not allowed. Therefore, this guidance conflicts with the standard and needs rewording or deleting so as to get rid of the ambiguity.</p> <p>125. Document: ATC Controller Section: 6.1.2.2 Page: 6-3 Paragraph or Item: Optional User Interfaces to the O/S Comment: Item 2 in the guidance says the Ethernet Port 2 provides a direct connection to a local laptop or PDA for diagnostics or software updates. However, section 7.3 and figure 7-3 on pages 7-23 and 7-24 say that Port 2 is a permanent network connection and that Port 3 is for diagnostics and for connecting a laptop without having to disconnect the comm network connection. Fix this guidance item 2 to say Port 3.</p> <p>126. Document: ATC Controller Section: 6.1.2.2 Page: 6-3 Paragraph or Item: Optional User Interfaces to the O/S Comment: Item 2 in the guidance says the Ethernet Port 2 provides a direct connection to a local laptop or PDA for diagnostics or software updates. The transmit and receive are reversed if Port 2 is intended to plug into an external hub versus if it is going to a laptop. Clarify which of these would need a crossover cable.</p> <p>127. Document: ATC Controller Section: 6.1.2.2 Page: 6-3 Paragraph or Item: Optional User Interfaces to the O/S</p>	<p>not banned.</p> <p>123. Document: ATC Controller Section: 6.1.2.2 Page: 6-2 Paragraph or Item: Optional User Interfaces to the O/S</p> <p>Infrared is optional to OS.</p> <p>Keyboard is dedicated to application.</p> <p>124-129 Guidance removed</p> <p>125. Document: ATC Controller Section: 6.1.2.2 Page: 6-3</p> <p>Agreed</p> <p>130. Document: ATC Controller Section: 6.1.4.1.1 Page: 6-4</p>
--	---	---

		<p>Comment: Item 4 in the guidance says hub Port 4 is intended for connecting a graphics device. However, figure 1-1 and figure 7-3 both show port 4 being the ENET2 connection to the Engine Board. Correct the port reference in the guidance.</p> <p>128. Document: ATC Controller Section: 6.1.3 Page: 6-3 Paragraph or Item: User Interface Pin Connections Comment: SP6 is restricted to being the application user interface and is not allowed as the O/S user interface, but the pinout shown here in 6.1.3 has CPURESET and CPUACTIVE pins, which are not application inputs. Make the SP6 connector a normal serial connector and put these special signals somewhere different. If a user wanted to use SP6 for the application user interface using a laptop rather than a front panel, as is allowed, it would not be wise to have a CPU reset on a pin that the laptop may think is for something else. For example, the CPURESET is on the pin normally used for Request To Send, which could be activated by a computer connected to the ATC.</p> <p>129. Document: ATC Controller Section: 6.1.3 Page: 6-3 Paragraph or Item: User Interface Pin Connections Comment: Clarify the guidance. Which connectors are meant by "all" connectors? Every connector in the Communications Interface? Every connector on the ATC front or rear panel? I assume only serial connectors?</p> <p>130. Document: ATC Controller Section: 6.1.4.1.1 Page: 6-4 Paragraph or Item: Keyboard Comment: Define specifically what is meant by "the complete single keystroke functionality (without key translations) of the standard ATC 2070 front panel". Misinterpretations often occur when saying something has to duplicate the functionality of something else without identifying specifically what is intended. Also, would it be better to let the API take care of this functionality?</p>	<p>This means: Each keystroke produces the keycode shown.</p> <p>131. Document: ATC Controller Section: 6.1.4.1.1 Page: 6-4 Wise to specify minimum key size and spacing.</p> <p>132. Document: ATC Controller Section: 6.1.4.1.2 Page: 6-4 Says it is connected to the signal. The signal comes from the Engine Board</p> <p>133. Document: ATC Controller Section: 6.1.4.1.3 Page: 6-4 Users actually care about the</p>
--	--	--	--

	<p>131. Document: ATC Controller Section: 6.1.4.1.1 Page: 6-4 Paragraph or Item: Keyboard Comment: Delete the last 3 sentences specifying the keyboard minimum dimensions or move it to an appendix for a specific model of ATC, maybe a 3070. If left in, clarify whether the 0.5 is center to center spacing or edge to edge.</p> <p>132. Document: ATC Controller Section: 6.1.4.1.2 Page: 6-4 Paragraph or Item: CPU ACTIVE LED Indicator Comment: Add "from the Engine Board" after the word "signal" if that is correct.</p> <p>133. Document: ATC Controller Section: 6.1.4.1.3 Page: 6-4 Paragraph or Item: Display Comment: Delete everything in the 1st paragraph except for the 1st 2 sentences. This is not something that needs to be standard, and it may be covered in the API. Move this to an appendix on a specific model of ATC, such as a 3070, if it is desired to keep it in the document.</p> <p>134. Document: ATC Controller Section: 6.1.4.1.4 Page: 6-4 Paragraph or Item: Cursor Comment: In the last sentence on the page, what other cursor functions are there that are meant to still be in effect?</p> <p>135. Document: ATC Controller Section: 6.1.4.1.5 Page: 6-5 Paragraph or Item: Reset Comment: Item 7 is more of an API item than an ATC controller spec. Move this to</p>	<p>direction of the contrast knob and the other items described.</p> <p>134. Document: ATC Controller Section: 6.1.4.1.4 Page: 6-4 Paragraph or Item: Cursor</p> <p>The functions described in the command codes</p> <p>135. Document: ATC Controller Section: 6.1.4.1.5 Page: 6-5</p> <p>Reset is a mechanical function, not an API. If the front panel processor is stalled the API won't help.</p> <p>Document: ATC Controller Section: 6.1.4.1.8</p>
--	---	--

	<p>the API.</p> <p>136. Document: ATC Controller Section: 6.1.4.1.8 Page: 6-5 Paragraph or Item: Special Characters Comment: In the 3rd paragraph, make the reference to the 2070 communications protocol more specific so that there is no confusion as to which 2070 protocol is intended when a person goes to look it up in the 2070 standard.</p> <p>137. Document: ATC Controller Section: 6.1.4.1.15 Page: 6-7 Paragraph or Item: Simultaneous Auto Wrap and AutoScroll Comment: In both sentences define what this behavior is in response to. Also, when it says "nothing should happen", be more specific as to "nothing" with respect to what?</p> <p>138. Document: ATC Controller Section: 6.1.4.1.16 Page: 6-7 Paragraph or Item: Displayable Characters Comment: Change the title to "Refresh Rate" since that what the section is defining.</p> <p>139. Document: ATC Controller Section: 6.1.4.1.21 Page: 6-8 and 6-9 Paragraph or Item: Configuration Command Codes Comment: Move this all to the API. This is a definition of how the ATC software should talk to the display, which is an API topic.</p> <p>140. Document: ATC Controller Section: 6.1.4.1.21 Page: 6-8 and 6-9 Paragraph or Item: Configuration Command Codes</p>	<p>Page: 6-5 Paragraph or Item: Special Characters</p> <p>Agreed</p> <p>137. Document: ATC Controller Section: 6.1.4.1.15 Page: 6-7 Paragraph or Item: Simultaneous Auto Wrap and AutoScroll</p> <p>Previous comment</p>
--	--	--

		<p>Comment: The Option 1, 2, and 3 referred to in the table NOTE are not defined anywhere.</p> <p>141. Document: ATC Controller Section: 6.1.4.2 Page: 6-9 Paragraph or Item: EIA-232 Port Comment: Is this the SP4 or SP6 or some other port? Is it really EIA 574 rather than 232? Clarify.</p> <p>142. Document: ATC Controller Section: 6.1.4.2 Page: 6-9 Paragraph or Item: EIA-232 Port Comment: In the first sentence, it says "at the same data rates". Same data rates as what?</p> <p>143. Document: ATC Controller Section: 6.2 Page: 6-10 Paragraph or Item: Power Supply General Description Comment: Remove the requirement for the power supply to be an independent module.</p> <p>144. Document: ATC Controller Section: 6.2 Page: 6-10 Paragraph or Item: Power Supply General Description Comment: Make the POWERUP, POWERDOWN, and LINESYNC signals optional in the ATC. For a specific model ATC, maybe a 3070, with the defined engine board, etc., this could be a requirement. Let other manufacturers determine how to accomplish the desired power interruption behavior of the controller without defining the specific internal signals.</p> <p>145. Document: ATC Controller</p>	
--	--	---	--

		<p>Section: 6.2.1 Page: 6-10 Paragraph or Item: "ON/OFF" Power Switch Comment: Make the switch optional. Many NEMA controllers do not have ON/OFF switches. The controller power is controlled from a switch in the cabinet.</p> <p>146. Document: ATC Controller Section: 6.2.2 Page: 6-11 Paragraph or Item: LED DC Power Indicators Comment: Make the indicators optional.</p> <p>147. Document: ATC Controller Section: 6.2.5.1 Page: 6-11 Paragraph or Item: Service Fail/Power Down and Sysreset/Power Up Comment: Move this specific description of these internal signals to an appendix for a specific ATC controller design, maybe a 3070, and for a general ATC controller, describe the controller's response to various voltage levels rather than the response of specific internal signals. The vendor may have a different internal approach to making the controller respond correctly to external power dips.</p> <p>148. Document: ATC Controller Section: 6.3.1.4 Page: 6-16 Paragraph or Item: Dimensions Comment: In the last paragraph on the page, delete or move the discussion about the functionality of the ACTIVITY LED and the "100" LED and the requirement for clear lenses. This section on dimensions is not where someone would look to find these functional descriptions.</p>	
Phys & User I/F	Coughlin	6-1 6.1 16 "It is not the intent of this specification to ... preserve user interface interchangeability among vendors ..." If this is the case, why shouldn't the pinout of the connector for removable front panels (formerly C60) be left to individual manufacturers? Suggest defining SP6 as an EIA-574 compliant connector with only serial port signals and leave connection of other signals to the manufacturer.	6-1 6.1 16 C60 Pinout.  Agree, and we

		<p>6-9 6.1.4.2 7 "The above key codes, configuration command codes and inquiry command-response codes may be conveyed via EIA-232 at the same data rates." Is this intended to be via SP6? Suggest "... shall be communicated via SP6 in the absence of a front panel display."</p> <p>6-12 6.2.5.1 1 There is no "SYSRESET" signal in the ATC.</p> <p>6-12 6.2.5.1 2 There is no "Service FAIL" signal in the ATC.</p> <p>6-12 6.2.5.2 6 "... shall synchronize to the 60 Hz service power ..." Figure 1-1 implies that service power can be either AC or DC.</p> <p>6-16 6.3.1.4 13, 31 minimum (aka required) and optional components should be listed separately.</p> <p>6-16 6.3.1.4 25,40 "Two Ethernet LEDs, labeled '100' and 'ACTIVE'" is listed twice. If these are for different ports, the entries should be so identified. Suggest re-wording to require these 2 LEDs for each ethernet port with an external connector on the chassis, of which there appear to be 3.</p> <p>6-16 6.3.1.4 27 NEMA MSA, MSB, MSC and MSD connectors are listed as being located on the front of the ATC regardless of (rack or shelf) mounting. Shouldn't these connectors be on the rear of the ATC for a rack-mounted unit?</p> <p>6-16 6.3.1.4 44 "LEDs shall employ clear lenses." This is redundant with 9.1.13.1, page 9-5, line 4.</p> <p>6-16 6.3.1.4 Serial Port 8 is defined as being required, but there is no corresponding physical requirement -- no external connector, no connection to the Communications Module connector, etc. Suggest defining SP8 as an EIA-232 compliant connector (25-pin D shell socket connector) on accessible face (front for shelf, rear for rack) of controller with signals as listed in Section 4.4.3.</p>	<p>had some discussion about this. We didn't want to refer to the EIA specifications, because other signals are needed, such as power, reset, etc. So we retained the C60 pinout without reserving any spare pins, so vendors are free to use the rest of the pins. We have no problem dropping this pinout requirement if users are OK with it. I recall NEMA vendors were chastised for using different PC cable pinouts among vendors.</p> <p>6-9 6.1.4.2 7</p> <p>Agreed and changed.</p> <p>6-12 6.2.5.1 1</p>
--	--	--	---

			<p>Agreed and changed</p> <p>6-12 6.2.5.1 2</p> <p>Agreed and changed.</p> <p>6-12 6.2.5.2 6</p> <p>Yes, service voltage may be DC. For this case, we made a subtle change here. The 2070 ATC required LINESYNC to stop at the SYSRESET signal. Here, LINESYNC continues until +5 VDC falls out of regulation. This means that if the service power is DC, a continuous square wave will be generated by a crystal oscillator, which will attempt to synchronize to a</p>
--	--	--	---

			<p>non-existence service frequency, and will continue until +5 VDC falls out of regulation. In other words, DC service voltage results in LINESYC generation from a crystal, uncorrected.</p> <p>6-16 6.3.1.4 13</p> <p>Minimum and optional is specified elsewhere. Here, we are simply stating whether each belongs on the front or the back.</p> <p>6-16 6.3.1.4 25,40</p> <p>Agree. Changed to match Figure 7-3.</p> <p>6-16 6.3.1.4 27</p>
--	--	--	---

			<p>Agree and changed.</p> <p>6-16 6.3.1.4 44</p> <p>Agree and changed.</p> <p>6-16 6.3.1.4</p> <p>We agree SP8 is not shown. One use has traditionally been a connection for a second FIO, which would be EIA-485. Another use has been as a diagnostic port for hardware and software debug. We are simply requiring it on the Engine Board because we know it is useful, but will allow vendors to configure it different ways.</p>
Phys & User I/F	Rausch	Bob Rausch requests specification for the maximum USB bus current of 500mA. Team suggests that we also require overcurrent protection (although NOT software reporting of overcurrent as detailed in the USB specification).	<p>Meeting notes from team:</p> <p>We decided at</p>

			<p>every meeting that the USB exists in the ATC to service a memory device only, and is not compliant to the USB standard because:</p> <ul style="list-style-type: none"><li>a) USB is not isolated like every other ATC connector that has a field cable attached</li><li>b) We are using IP-addressable networking, not USB for networking</li><li>c) We can power a USB memory device from the Power Supply, instead of from the sensitive Engine Board, as required by the USB standard.</li></ul> <p>We recommended that the USB should be optional, not</p>
--	--	--	---

			<p>required because:</p> <ul style="list-style-type: none"><li>a) Several users were concerned about the security of a USB memory device replacing a PDA/password for downloading application code</li><li>b) All 2070ATC users already have a Data Key for intersection data</li><li>c) Users will plug a 500 FT long cable into the unisolated USB plug and upset the controller</li></ul> <p>Resolution:</p> <p>The USB is now required, but as a memory device only. The USB power consumption has nothing to do with the Engine Board</p>
--	--	--	--

			<p>The Power Supply spec states that it must supply enough +5 VDC to power the host board's power budget, which includes the now-required USB port.</p> <p>A statement has also been added to the Engine Board section indicating the bus must be capable of supplying 500mA at 5VDC and must be current-limited.</p>
P/S I/O	Powell	<p>7.1 Compatibility Requirements</p> <p>The following compatibility requirements must be met by the PI/O.</p> <p>7.1.1 Serial Interface Compatibility</p> <p>The serial communications interface to the FI/O will be compatible with similar units covered by the following standards:</p> <ul style="list-style-type: none"> <li>* NEMA TS-2</li> <li>* NEMA TS-2 Type 1</li> <li>* NEMA TS-2 Type 2</li> <li>* CALTRANS Type 170</li> </ul>	<p>Commands and Responses used to read inputs and store outputs are identical, regardless of cabinet type, be it NEMA, 332 or ITS. This is a fundamental advantage of the ATC architecture over Type 170</p>

	<p>* Joint NEMA/AASHTO/ITE/CALTRANS 2070 ATC</p> <p>7.1.2 Electrical Compatibility</p> <p>The power input to the FI/O will be compatible with similar units covered by the following standards:</p> <ul style="list-style-type: none"> <li>* NEMA TS-2</li> <li>* NEMA TS-2 Type 1</li> <li>* NEMA TS-2 Type 2</li> <li>* CALTRANS Type 170</li> <li>* Joint NEMA/AASHTO/ITE/CALTRANS 2070 ATC</li> </ul> <p>7.2 Module Identification and I/O Configuration</p> <p>The number of general purpose Inputs and Output signals is determined by the controller ID value as show in the table below. The ID value for a controller can be determined by using the Module Identification command.</p> <pre> +-----+-----+-----+-----+  Version   ID   Inputs   Outputs   +-----+-----+-----+-----+   2A   1   64   64   +-----+-----+-----+-----+   2C   2   120   104   +-----+-----+-----+-----+   2N   3   120   104   +-----+-----+-----+-----+ </pre> <p>In this document, the following terms will be used to refer to the number of IO signals on a particular controller.</p> <p>INPUT_COUNT = number of controller Inputs  INPUT_BYTE_COUNT = (INPUT_COUNT+7)/8  OUTPUT_COUNT = number of controller Output</p>	<p>and NEMA controllers. A common software package may be used in every cabinet type. Therefore, the command and response specifications are written identically in each Joint Committee standard.</p> <p>Now, let's pick up where we left off in San Diego. Recall that the Cabinet Working Group received a number of comments to improve the wording of the commands and responses. The Cabinet Working Group chose to defer these changes to the Controller Working Group meeting the next day, in order to</p>
--	---	---

	<p>OUTPUT_BYTE_COUNT = (OUTPUT_COUNT+7)/8</p> <p>7.3 Digital Input Signals</p> <p>The number of general purpose digital inputs is determined by the controller ID. The signals will be consecutively numbered from 0 to the maximum input signal number, i.e. - INPUT_COUNT - 1.</p> <p>7.3.1 Input Signals Electrical Requirements</p> <p>All digital input signals will meet the following requirements. Each input shall be read logic "1" or "on" when the input voltage at its field connector input is less than 3.5 VDC, and shall be read logic "0" or "off" when either the input current is less than 100 µA or the input voltage exceeds 8.5 VDC. Each input shall have an internal pull-up to a (isolated) +12 VDC power and shall not deliver greater than 20 mA to a short circuit to ground. The external applied input voltage must not be greater than 40 DC or less than -2V.</p> <p>7.2.2 LINESYNC Signal</p> <p>A LINESYNC digital input will be provided that has the same electrical and timing characteristics as the general purpose input signals.</p> <p>7.2.2 LINESYNC Signal Monitoring</p> <p>The LINESYNC signal will be monitored by the PI/O. If there are no input transitions for more than 100 milliseconds or more than 10 "0" to "1" input transitions in less than a 100 millisecond period a LINESYNC failure condition will exist and the LINESYNC Failure status bit will be set to "1". The LINESYNC Failure status bit will be cleared on reset or by actions of the Request Module Status command.</p> <p>***** *****</p>	<p>preserve identical wording.</p> <p>The Controller Working Group instructed the contractor to review the command/response comments from the Cabinet Working Group and those from the Controller Working Group to produce a common command/response specification for the 2070 ATC, ITS Cabinet, and ATC. The contractor agreed to include this in Draft 4 of the ATC Standard. I recall the chairman calling for any last-minute changes as the last act of the San Diego meeting.</p> <p>Over the next</p>
--	---	---

	<p>*  * Note: implementation of the LINESYNC monitoring can 'piggyback' on  * the Input Changes code - you simply keep a record of the  * MC times of the last 20 transitions of the LINESYNC signal.  *  * When the time from the last input change  * exceeds 100 millisecs, you have no activity;  * When the time from the first input change  * in the buffer is less than 100 msec you have too  * many transitions. Note that 10 cycles @ 60 hz is  * 166.66 milliseconds.  *  *****  *****</p> <p>7.4 Digital Output Signals</p> <p>The PI/O (Version 2A) shall provide a minimum of 64 bits of current sink and the The PI/O (Version 2B) shall provide a minimum of 104 bits of current sink (i.e. - open collector or similar technology) output signals.</p> <p>7.4.1 Output Signal Electrical Requirements</p> <p>In the logic "0" or "off" state each output shall source or sink less than 200 microamps of current. In the logic "1" or "on" state each output shall be capable of sinking a minimum of 100 mA with an output voltage level less than 4.0 VDC. The externally applied output voltage must not exceed 40V DC or be less than -2V.</p> <p>The transition time when switching from "0" or "off" to "1" or "on" or vice versa shall be less than 100 microseconds when connected to a resistive load of 100 K-Ohms.</p> <p>Each output circuit shall withstand transients of 10 ±2 microseconds duration of ±300 VDC from a 1 K-Ohm source at a maximum rate of 1</p>	<p>four weeks, we received six more batches of command/responses comments for the ITS Cabinet and two more batches for the ATC, so completing this task without delaying the milestone dates set down by ITE proved impossible. Instead, we added guidance to Draft 4, stating that improved command / response wording was to follow.</p> <p>At this point in time, we have received more proposals to change the wording of the commands and responses, but no proposals to change the operation of the</p>
--	---	---

	<p>pulse per second.</p> <p>When set to logical "0" or "1", each output signal will not change until set to a new value or a Reset Condition occurs. On reset, each output will be set to a logic "0" or "off" condition.</p> <p>7.4.2 Watchdog Muzzle Jumper</p> <p>An External WDT "Muzzle" Jumper shall be provided internal to the PI/O. With the jumper IN, after a system reset the PI/O shall output a state change on Output Port 5, bit 8 (Connector C1, pin 103 - Monitor Watchdog Timer Input) every 100 milliseconds for 10 seconds or until the reception of a command by the PI/O. Additional output activity will then occur as the result of commands sent to the PI/O.</p> <p>When the jumper is OUT this activity will not take place.</p> <p>7.5 Reset Conditions</p> <p>The PI/O will monitor power supply voltages and the external CPU RESET and POWER UP signals. When any power supply voltages are out of operational range, the CPU RESET signal is active, or the POWER UP signal is inactive then a Reset Condition will be present and the PI/O will be reset.</p> <p>The PI/O will start operation within a maximum of 100 milliseconds after the Reset Condition is no longer active. The PI/O will cease operation within a minimum of 1 millisecond after the Reset Condition is active. The state of the Digital Output signals will be set to "0" or "off" within 1 millisecond after the Reset Condition is active.</p> <p>After a reset, the PI/O will set the Communications Timeout and Reset status bits. These bits will stay set until cleared by a Request Module Status command. The Configure Input Tracking Function and Configure</p>	<p>commands and responses.</p> <p>Ok, now put yourself in the shoes of a software developer. You are writing a software package that will run on all ATCs and in all cabinet styles. Imagine you want to turn on Load Switch 1. The command to turn on Load Switch 1 is identical for the all of the cabinet styles and for all of the ATCs. But you discover that the command to turn on Load Switch 1 is described three different ways. The Controller Working Group describes it one way in the 2070 ATC standard. The Cabinet</p>
--	--	--

	<p>Complex Output Function configuration information is also cleared by a Reset condition.</p> <p>7.6 Digital Input Processing</p> <p>The following describes the required functionality for processing the digital inputs.</p> <p>7.6.1 Millisecond Clock (MC) and Timestamps</p> <p>A 1 KHz time reference shall be used to generate timestamps for digital input processing. The clock shall maintain a frequency accuracy of <math>\pm 0.01\%</math> (<math>\pm 0.1</math> counts per second).</p> <p>The time reference will be used to update the 32 Millisecond count (MC). The value of this counter will be used as a timestamp for the Digital Input processing operations.</p> <p>If there are no MC clock updates for 10 transitions of the LINESYNC signal then the MC Failure status bit will be set to 1. The MC Failure status bit will be cleared by system reset or the Request Module Status command. When the MC Failure status bit is 1, all outputs will be set to the "0" or "off" state.</p> <p>*****</p> <p>*  * The 1KHz time reference shall be synchronized with the 0-1 transition  * of the LINESYNC signal once a second.  *  * ????? I am puzzled by this... ?????  *  * Note: the methodology for doing this should be explicitly spelled  * out, and various problems, such as bogus LINESYNC transitions,  * etc., should be taken into consideration.  *</p>	<p>Working Group describes it a second way in the ITS Cabinet Standard. The ATC Standard describes it a third way in this standard.</p> <p>Since the command/response specification will be used daily by software developers, and not by equipment vendors, the contractor suggests leaving the command/response description identical for each of the existing three standards.</p> <p>Further, we expect new readings of the command/response section to spawn more wording changes for clarity.</p>
--	--	---

	<p>* I think that this should be dropped. I suggest that one  * of the digital inputs be reserved to report the value of the  * LINESYNC signal, which would be much more useful.  * Patrick Powell  *  *****</p> <p>Each time the MC clock is updated the Digital Inputs are processed using the following algorithm. Alternative methods can also be used as long as the timing and order restrictions of the algorithm are met.</p> <p>7.6.2 Input Scanning</p> <p>Input scanning shall start no later than 100 microseconds after the MC clock value is updated. At the start of the scanning process the current value of MC is obtained and is recorded as the timestamp for the input value sample. The current values of all of the digital inputs shall be captured within 100 microseconds from the start of the input scanning operation. If inputs are scanned sequentially, input value capture shall begin at IO (bit 0) and proceed to the highest input in sequential order.</p> <p>Captured values are stored in the Raw Input Buffer and are accessed using the Poll Raw Inputs command.</p> <p>The current value of the LINESYNC signal will be sampled at this time and used in generating output values or for other purposes.</p> <p>7.6.3 Input Filtering</p> <p>After the Input Scanning operation has completed, the Input Filtering operation is performed. Each digital input has associated leading and trailing edge filter times, which determine the number of sample periods that a signal must be in the "on" or "off" condition before a signal</p>	<p>Instead of constantly reconciling three standards, the contractor suggests the creation of a new document titled "ATC Input/Output Developer's Guide". The purpose of this document would be to collect all of the "helpful hints".</p>
--	---	--

	<p>change is recorded. If the change of state is less than the respective time then no change is recorded.</p> <p>The filter time values can be in the range from 0 (effectively no filtering) to 255 (255 milliseconds). After a Reset Condition, the leading and trailing edge filter values are set to 5 (i.e. - 5 milliseconds).</p> <p>The time stamp recorded by the Input Scanning operation is used as the timestamp for the Input Filtering operation.</p> <p>Filtered input values are stored in the Filtered Input Buffer, and can be accessed using the Poll Filtered Inputs command.</p> <p>The Input Filtering operation must be completed before the time for the next Input Scanning operation.</p> <h4>7.6.4 Input Transition Detection</h4> <p>The PI/O can be configured to monitor selected Digital Inputs for transitions.</p> <h5>7.6.4.1 Transition Buffer</h5> <p>A Transition Buffer shall be provided capable of holding a minimum of 1024 entries. Each Transition Buffer entry has a 1 bit LEVEL field, a 7 bit SIGNAL field, and a 16 bit TIMESTAMP field. There are two entry types of entries: Transition and Rollover. Input transitions are detected by monitoring the values in the Filtered Input Buffer and the associated timestamp.</p> <h5>7.6.4.2 Transition Entries</h5> <p>At the start of the Input scanning process, the new timestamp value is checked for for rollover, i.e. a transition from \$XXXX \$FFFF to</p>	
--	---	--

\$XXXX+1 \$0000. If rollover has occurred, then a Rollover entry is added to the Transition Buffer, which has a LEVEL value of 1, a SIGNAL value is 127 (\$7f), and the TIMESTAMP field is the MSB 16 bits of the Filtered Input Buffer, i.e. \$XXXX+1.

During the Input Filtering process, if inputs which have been configured for transition monitoring have their filtered values change then a Transition entry is added to the Transition buffer. The Transition entry LEVEL value is the new signal value (0/1), the SIGNAL value is the signal number (0 - maximum configured number of inputs), and TIMESTAMP field is the LSB 16 bits of the Filtered Input Buffer.

```
+-----+-----+-----+-----+
| Type | LEVEL | SIGNAL | TIMESTAMP |
+-----+-----+-----+-----+
| Rollover | 1 | 127 | MSB 16 Bits of Timestamp |
+-----+-----+-----+-----+
| Transition | 0/1 | 0 - MAX | LSB 16 Bits of Timestamp |
+-----+-----+-----+-----+
```

#### 7.6.4.3 Overflow and Time Requirements

The Input Transition checking operation must be completed before the time for the next Input Scanning operation.

If the Transition Buffer is full when an entry is to be added, the entry is discarded and the Transition Buffer Overflow (F) status bit is set.

The Poll Input Transition Buffer command is used to remove Transition Buffer entries. See the command description for details of its operation.

### 7.6.1 Poll Input Commands and Input Scanning

A Poll Input Command (Poll Raw Inputs, Poll Filtered Inputs, Poll Input Transitions) shall be held pending until the input scanning for the current 1 millisecond interval has completed.

Similarly, an input scan operation should not start until all of the data required for an ongoing Poll Input Command has been processed from the current Raw Input Buffer, Filtered Input Buffer, and Transition Buffer.

\*\*\*\*\*

\* Implementation note:

- \* a response to a command can usually be generated safely
- \* by setting a flag to request the various data buffers to
- \* be copied by the input scanning code, or even to format the
- \* response message and start its transfer.

\*\*\*\*\*

### 7.7 Output Processing

Output values can change due to several causes: Set Outputs command or as the result of configuration values set by the Configure Input Tracking Function or Configure Complex Output Function.

#### 7.7.1 Set Output Command Latency

When a Set Outputs command is received, the output values take on their specified values within 2 milliseconds from the time of the commands reception.

#### 7.7.2 LINESYNC Signal Synchronization

Each output can be configured to be "off", "on", or "on" but synchronized with the LINESYNC signal by using the associated Data and Control values

for each signal as shown in the table below.

In the last case, the current sampled value of the LINESYNC signal is used to determine the value of the output signal. All output signals whose values are based on the value of the LINESYNC signal will be changed within 100 microseconds of each other and within 2 milliseconds of a LINESYNC signal change.

If the LINESYNC signal fails then the dependent outputs will be turned "off" until the LINESYNC signal failure ends.

### 7.7.3 Output Data and Control Bits

Each output has an associated Data and Control bit that is used to determine the output value.

Data	Control	Action
0	0	"0" or "off"
1	0	"1" or "on"
0	1	"1" or "on" when LINESYNC is "on" "0" or "off" when LINESYNC is "off"
1	1	"1" or "on" when LINESYNC is "off" "0" or "off" when LINESYNC is "on"

### 7.7.4 Configure Input Tracking Command

The Configure Input Tracking Function command can be used to specify that an output signal value tracks the value of an input signal and possibly the LINESYNC signal.

The Raw Input Buffer values are used to determine the output signal values, and all effected output values will be updated within 2 millisecond of the input signal change and the reception of a Configure Input Tracking Function command and/or change in the LINESYNC signal value.

#### 7.7.5 Configure Complex Output Function Command

The Configure Complex Output Function command can be used to specify that an output signal value depends on a combination of timing values for on or off times, a raw or filtered input signal value, the LINESYNC signal value.

All effected output values will be updated within 1 millisecond of a change in the signal value in the Raw or Filtered Input buffers. They will also be updated within 2 milliseconds of a change in the LINESYNC signal value or reception of a Configure Complex Output Function command.

#### 7.7.2 Controlled Output Signals and Conflicts

At most 8 (8) output signals can be under the control of configuration information specified by the Configure Input Tracking Function command or Configure Complex Output Function command.

If an output signal has been configured to have its value set by the Input Tracking Function or the Complex Output Function function then the Set Output command will have no effect on these outputs until the Input Tracking Function or the Complex Output Function is disabled.

If an output is configured to be under control of both the the Input Tracking Function or the Complex Output Function then its output value is undefinded.

### 7.8 Serial Data Communications

	<p>All communication to the PI/O by a host via a command-response protocol. Commands to the PI/O and responses from the PI/O are sent using a serial data channel. Each command and response is sent in a frame; the details of the frame format are dependent on the underlying transport protocol. The format of the payload or message part of a frame is defined by this section of the standard.</p> <p>The serial data channel physical interface is not controlled by this specification, and interchangeability among vendors from PI/O to Engine Board is not intended. For example, communications to PI/O module may be implemented via EIA-485 at 614 K bps, 5V TTL, or via a 1 GHz fiber channel, provided all PI/O specifications herein are met, including:</p> <ul style="list-style-type: none"><li>* Command and Response Message Content</li><li>* Command and Response Timing</li></ul> <h4>7.8.1 Command/Response Protocol</h4> <p>The host system shall always initiate communications by sending a command to the PI/O. If the received frame or message is incomplete, in error, or the message does not meet the defined command formats, the PI/O will not generate a response and will increment the 8 bit Receive Error Count value.</p> <p>When the Receive Error Count rolls over (\$FF to \$00), the Receive Error Count Rollover status bit is set.</p> <p>If additional commands are sent to the PI/O before it has completed its response to a previous message, the actions of the PI/O are explicitly undefined. The message can be ignored, treated as an error, or processed normally depending on Vendor implementation.</p> <p>The length of command and response messages depends on the command type and also the PI/O configuration, i.e. - number of inputs and/or output</p>	
--	---	--

signals supported.

### 7.8.2 Message Identification

The command or response type is determined by the value of the first byte of the message which referred to as the type field. Command type values in the range from \$00 - \$6F are for PI/O operations, with values \$70 - \$7F reserved for Vendor specific functions. Response type values are corresponding command type values + \$80, i.e. - commands values \$00 - \$6F have response values \$80 - \$EF. and Vendor commands \$70 - \$7F have response values \$F0 - \$FF.

The following command and response messages are defined in this document. All other values are reserved for future expansion.

Command Type	Response Type	Name	Command Length	Response Length
49 (\$31)	177 (\$B1)	Request Module Status	2	8
50 (\$32)	178 (\$B2)	MC Management	5	2
51 (\$33)	179 (\$B3)	Configure Inputs 3-194	2	
52 (\$34)	180 (\$B4)	Poll Raw Input Data 1	13-20	
53 (\$35)	181 (\$B5)	Poll Filtered Input Data 1	13-20	
54 (\$36)	182 (\$B6)	Poll Input Transition Buffer 2	8-773	
55 (\$37)	183 (\$B6)	Set Outputs 17-27	2	
56 (\$38)	184 (\$B8)	Configure Input Tracking	18	6
57 (\$39)	185 (\$B9)	Configure Complex Output Functions 2-58	6	
59 (\$3B)	187 (\$BB)	Controller Identification	1	2-130
60 (\$3C)	188 (\$BC)	Module Identification	1	2
63 (\$3F)	191 (\$BF)	Poll Variable Length Raw Inputs	2	4-20
64 (\$3F)	191 (\$BF)	Poll Variable Length Filtered Inputs	2	4-15

Guidance:

The following Commands and Responses are intended to match the CALTRANS TEES and the Joint NEMA/AASHTO/ITE 2070 ATC commands and responses.

	<p>The following Commands and Responses are intended to match the CALTRANS TEES and the Joint NEMA/AASHTO/ITE 2070 ATC commands and responses.</p> <p><b>7.8.3 Command/Response Timeouts</b></p> <p>The PI/O is required to initiate a response to a received command no later than 4 milliseconds after its reception by the PI/O</p> <p>The overall latency or command/response round trip time depends on the command and response lengths, overhead of the underlying transport protocol, and serial line speeds.</p> <p>If the PI/O is unable to initiate a response within the specified timeout period, it will increment the 8 bit Transmit Error Count value. When the Transmit Error Count rolls over (\$FF to \$00), the Transmit Error Count Rollover status bit is set.</p> <p>If the PI/O does not receive an error free command from the host system within 2 seconds of the last command, the Communications Timeout flag will be set.</p> <p><b>7.8.5 Command and Response Messages</b></p> <p>Several of the Command and Response message have fields that span multiple bytes and represent 16 or 32 bit values. These values are represented using Network Standard Order or Big Endian order, where the Most Significant Byte (MSB) is the first byte, followed by the Next Most Significant Byte (NMSB), and so forth, ending with the the Next Least Significant Byte (NLSB) and the Least Significant Byte (NLSB).</p> <p>Unless explicitly indicated otherwise, all values transferred in the Command and Response messages are unsigned, i.e. - represent values greater than or equal to 0. This includes values that are encoded in bit fields which are part of the message.</p>	
--	---	--

	<p>The word UCHAR used in the following descriptions indicates a byte or 8 bit value value with range from 0-255. The UCHAR[N] indicates an array of N bytes or 8 bit values.</p> <p>Bits in a byte are labelled from D0, (least significant bit or LSB) through D7 (most significant bit or MSB).</p> <p>7.8.5.1 Request Module Status</p> <p>The Command shall be used to request PI/O status information response. Command/response frames are as follows:</p> <p>Request Module Status Command</p> <p>Field Value or Format Byte Type 49 or \$31 1 Reset Status Bits StatusBits 2</p> <p>Request Module Status Response</p> <p>Field Value or Format Byte Type 177 or \$B1 1 System Status Bits StatusBits 2 Receive Error Count UCHAR 3 Transmit Error Count UCHAR 4 Timestamp MSB UCHAR 5 Timestamp NMSB UCHAR 6 Timestamp NLSB UCHAR 7 Timestamp LSB UCHAR 8</p> <p>7.8.5.1.1 StatusBits Format</p> <p>The StatusBits field has the following bit assignments which report the current value of the various PI/O status bits.</p>	
--	--	--

		<p>Bit Name or Description  D7 Reset  D6 Communications Timeout  D5 MC Failure  D4 LINESYNC Failure  D3 (reserved - 0 value)  D2 Receive Error Count Rollover  D1 Transmit Error Count Rollover  D0 (reserved - 0 value)</p> <p>Comment: D3 corresponds to the CALTRANS Model 2070 Watchdog Reset bit. This functionality is not part of the FI/O controller and the value is reported as 0. D0 corresponds to the CALTRANS Model 2070 Watchdog DataKey present bit. This functionality is not part of the FI/O controller and the value is reported as 0.</p> <p>7.8.5.1.2 Actions</p> <p>The Request Module Status command will reset any status bits whose value is "1" in the StatusBits field. The response message shall report the current status bits and the current</p> <p>7.8.1.2 MC Management</p> <p>The MC Management command sets the value of the MC counter.</p> <p>MC Management Command</p> <p>Field Value or Format Byte  Type 50 or \$32 1  Timestamp MSB UCHAR 2  Timestamp NMSB UCHAR 3  Timestamp NLSB UCHAR 4  Timestamp LSB UCHAR 5</p>	
--	--	---	--

	<p>MC Management Response</p> <p>Field Value or Format Byte  Type 178 or \$B2 1  Status Status 2</p> <p>7.8.5.2.1 Status Format</p> <p>The response Status field has the following bit assignments or values.</p> <p>Bit Description or Value  D7-D1 (reserved) 0  D0 Error</p> <p>7.8.5.2.2 Actions</p> <p>The 32-bit Timestamp value shall be loaded into the MC at the next 0-1 transition of the LINESYNC signal or immediately if a LINESYNC failure condition is present. The response Error bit will be set to "1" if a LINESYNC Failure or MC Failure condition exists.</p> <p>7.8.5.3 Configure Inputs</p> <p>The Configure Inputs command sets input configurations.</p> <p>Configure Inputs Command</p> <p>Field Value or Format Byte  Type 51 or \$33 1  Count 0-64 2  Items 3 BYTES/entry 3 - 3*Count</p> <p>Configure Inputs Response</p>	
--	---	--

	<p>Field Value or Format Byte Type 179 or \$B3 1 Status Status 2</p> <p>7.8.5.3.1 Items Format</p> <p>Byte Bits Field Name Values 1 D7 Ignore Input 0/1 1 D6-D0 Input 0 - maximum Input number 2 UCHAR Leading_edge_filter 0-255 3 UCHAR Trailing_edge_filter 0-255</p> <p>The Input value specifies the input number to configure. If the Ignore Input value is "1" input transitions are not monitored for this input. The Leading_edge_filter and Trailing_edge_filter fields set the values to be used by the Input Filtering algorithm.</p> <p>If multiple entries for the same input are present then the last entry with the duplicate input number is used to set the input configuration. There is no restriction on the order in which inputs must appear in the configuration list.</p> <p>A maximum of 64 inputs can be configured at a time.</p> <p>7.8.5.3.2 Error Conditions</p> <p>If the Input value is larger than the maximum Input number, then the Error bit is set in the Configure Inputs response and the input configurations are not applied.</p> <p>7.8.5.2.3 Status Format</p> <p>The response Status field has the following bit assignments or values.</p>	
--	--	--

		<p>Bit Description or Value  D7-D1 (reserved) 0  D0 Error</p> <p>7.8.5.4 Poll Raw Input Data</p> <p>The Poll Raw Input Data command will return the current value of the Raw Input Buffer and the associated timestamp value. The size of the response depends on the number of input signals supported by the controller.</p> <p>Poll Raw Inputs Command</p> <p>Field Value or Format Byte  Type 52 or \$34 1</p> <p>Poll Raw Inputs Response</p> <p>Field Value or Format Byte  Type 180 or \$B4 1  Inputs UCHAR[N] 1 - N  Timestamp MSB UCHAR N+1  Timestamp NMSB UCHAR N+2  Timestamp NLSB UCHAR N+2  Timestamp LSB UCHAR N+4  Where N = INPUT_BYTE_COUNT for the controller</p> <p>7.8.5.4.1 Inputs Field</p> <p>Input signal values are presented in the Inputs field using Network Standard Order, where Input 0 is least significant bit (D0) of first byte of the Inputs (Byte 1), Input 1 is D1, etc.</p>	
--	--	---	--

		<p>7.8.5.5 Poll Filtered Input Data</p> <p>The Poll Filtered Input Data command will return the current value of the Filtered Input Buffer and the associated timestamp value. The size of the response depends on the number of input signals supported by the controller.</p> <p>Poll Filtered Inputs Command</p> <p>Field Value or Format Byte Type 53 or \$35 1</p> <p>Poll Filtered Inputs Response</p> <p>Field Value or Format Byte Type 181 or \$B5 1 Inputs UCHAR 1 - N Timestamp MSB UCHAR N+1 Timestamp NMSB UCHAR N+2 Timestamp NLSB UCHAR N+2 Timestamp LSB UCHAR N+4 Where N = INPUT_BYTE_COUNT for the controller</p> <p>7.8.5.5.1 Inputs Field</p> <p>Input signal values are reported in the Inputs field using Network Standard Order, where Input 0 is least significant bit (D0) of first byte of the Inputs (Byte 1), Input 1 is D1, etc.</p> <p>7.8.5.6 Poll Input Transition Buffer</p> <p>The Poll Input Transition Buffer frame shall return all or part of the contents of the Input Transition buffer. See ** Input Transition Buffer ** for details on the contents of the Input Transition Buffer.</p>	
--	--	---	--

		<p>Poll Input Transition Buffer Command</p> <p>Field Value or Format Byte  Type 54 or \$36 1  Blocknumber UCHAR 2</p> <p>Poll Input Transition Buffer Response</p> <p>Field Value or Format Byte  Type 182 or \$B6 1  Blocknumber UCHAR 2  Count UCHAR 3  TEntry 3 BYTES/entry 2 + 3*Count  Status Status 4 + 3*Count  Timestamp MSB UCHAR 5 + 3*Count  Timestamp NMSB UCHAR 6 + 3*Count  Timestamp NLSB UCHAR 7 + 3*Count  Timestamp LSB UCHAR 8 + 3*Count</p> <p>7.8.5.6.1 TEntry Format</p> <p>Transition Entry:</p> <p>Byte Bits Field Name Values  1 D7 Value 0/1  1 D6-D0 Input 0 - maximum Input number  2 UCHAR Timestamp NLSB 0-256  3 UCHAR Timestamp LSB 0-256</p> <p>Rollover Entry:</p> <p>Byte Bits Field Name Values  1 D7 Value 1</p>	
--	--	---	--

	<p>1 D6-D0 Input 127 (\$7F)  2 UCHAR Timestamp MSB 0-256  3 UCHAR Timestamp NMSB 0-256</p> <p>7.8.5.6.2 Status Format</p> <p>Bit Name or Description  D7-D4 (reserved) 0  D3 More Data Available  D2 Transition Buffer Overflow  D1 Duplicate Request  D0 Out of sequence</p> <p>7.8.5.6.3 Actions</p> <p>The Poll Input Transition Buffer command is used to obtain Input Transition Buffer entries.</p> <p>When a Poll Input Transition Buffer command is received, the command Blocknumber field (range 0-255) is compared to the blocknumber value of the last Poll Input Transition response.</p> <p>If they are not identical or no response has been sent, then the set of Transition Buffer Entries sent in the last response will be deleted from the Input Transition Buffer, and any remaining Transition Buffer Entries will be sent, up to the maximum size allowed by the Poll Input Transition Buffer response.</p> <p>If the Blocknumber fields are the same, the same set of Transition Buffer Entries sent in the last response will be resent and the Duplicate Request bit set in the Status byte.</p> <p>If the command Blocknumber value is not equal to the last response Blocknumber value + 1 (modulus 256), then the Out of Sequence bit in the Status byte is set. If there are more entries in the Transition</p>	
--	---	--

		<p>Buffer than sent in the response message, then the More Data Available bit will be set in the Status byte. If the Transition Buffer Overflow status bit is set, then the Transition Buffer Overflow status bit in the Status field will be set.</p> <p>The Timestamp value will be the current timestamp associated with the Input Transition Buffer.</p> <p>7.8.5.7 Set Outputs</p> <p>The Set Outputs command will update the Digital Outputs according to the data in the command.</p> <p>Set Outputs Command</p> <p>Field Value or Format Byte  Type 55 or \$37 1  Value UCHAR[N] 1 - N  Control UCHAR[N] 2 - 2*N  Where N = OUTPUT_BYTE_COUNT for the controller</p> <p>Set Outputs Response</p> <p>Field Value or Format Byte  Type 183 or \$B7 1  Status Status 2  Timestamp MSB UCHAR 3  Timestamp NMSB UCHAR 4  Timestamp NLSB UCHAR 5  Timestamp LSB UCHAR 6</p> <p>7.8.5.6.1 Outputs</p> <p>Output signal Value and Control values are presented in the Value and Control fields using Network Standard Order, where Input 0 is least</p>	
--	--	---	--

	<p>significant bit (D0) of first byte of the field (Byte 1), Input 1 is D1, etc. See ** Digital Outputs ** for the effects of these values.</p> <p>7.8.5.6.2 Status Format</p> <p>Bit Name or Description  D7-D2 (reserved) 0  D1 LINESYNC Fault  D0 Error</p> <p>If there is any error setting the output values, the Error flag in the Status byte shall be set to '1'. The LINESYNC Fault bit is set to the current value of the LINESYNC Fault status bit.</p> <p>7.8.5.7 Configure Input Tracking</p> <p>The Configure Input Tracking command is used to configure outputs to respond to input signal transitions on a specified input.</p> <p>Configure Input Tracking Command</p> <p>Field Value or Format Byte  Type 56 or \$38 1  Count 0-16 2  Items 2 BYTES/entry 3 - 3*Count</p> <p>Configure Inputs Response</p> <p>Field Value or Format Byte  Type 179 or \$B3 1  Status Status 2  Timestamp MSB UCHAR 3  Timestamp NMSB UCHAR 4  Timestamp NLSB UCHAR 5  Timestamp LSB UCHAR 6</p>	
--	--	--

	<p>7.8.5.7.1 Items Format</p> <p>Byte Bits Field Name Values 1 D7 Enable Tracking 0/1 1 D6-D0 Output 0 - maximum Output number 2 D7 Invert Input 0/1 2 D6-D0 Input 0 - maximum Input number</p> <p>Definitions are as follows:</p> <p>Enable Tracking 1 Enable input tracking functions for this output 0 Disable input tracking functions for this output Invert Input 1 Output is "off" when input is "on", "on" when input "off" 0 Output is "on" when input is "on", "off" when input "off"</p> <p>7.8.5.7.2 Status Format</p> <p>The response Status field has the following bit assignments or values.</p> <p>Bit Description or Value D7-D1 (reserved) 0 D0 Error</p> <p>7.8.5.7.3 Actions</p> <p>There is a limit of at most 8 outputs that can be configured for control by both the Configure Input Tracking and Configure Complex Output commands. The following algorithm is used to process the Configure Input Tracking command.</p> <p>The entries are processed in sequence, with the requested configuration changes applied in the order they appear in the command. If after processing entries there are more than 8 outputs configured for control by both the Configure Input Tracking and Configure Complex Output</p>	
--	---	--

	<p>commands, or an out or range input or output number was specified in the configuration information then the original configuration values will be restored and a response sent with the Error bit set.</p> <p>Enabling or disabling input tracking for an output will delete any Complex Output configuration.</p> <p>When enabled for input tracking, the output will change to the corresponding input value within 2 milliseconds of the command being received. When the input value changes, the output value will change within 2 milliseconds.</p> <p>When input tracking is disabled for an output then the output will change to the state specified by the last Set Output command.</p> <p>The response Timestamp value will be taken from the current Raw Input Buffer timestamp.</p> <p>7.8.5.7 Configure Complex Output</p> <p>The Configure Complex Output command is used to specify a complex output for one to eight outputs. There is a limit of at most 8 outputs that can be configured for control by both the Configure Input Tracking and Configure Complex Output commands. Two output forms shall be provided: single pulse and continuous oscillation. These output forms can start immediately after command processing or on a specified input signal transition. In the case of continuous oscillation, changes can continue until otherwise configured or only when a specified input value is on.</p> <p>Configure Complex Output Command</p> <p>Field Value or Format Byte  Type 57 or \$39 1  Count 0-16 2  Items 7 BYTES/entry 3 - 7*Count</p>	
--	---	--

		<p>Configure Inputs Response</p> <p>Field Value or Format Byte  Type 179 or \$B3 1  Status Status 2  Timestamp MSB UCHAR 3  Timestamp NMSB UCHAR 4  Timestamp NLSB UCHAR 5  Timestamp LSB UCHAR 6</p> <p>7.8.5.7.1 Items Format</p> <p>Byte Bits Field Name Values  1 D7 (unused) 0  1 D6-D0 Output 0 - maximum Output number  2 UCHAR Primary Duration MSB 0 - 255  3 UCHAR Primary Duration LSB 0 - 255  4 UCHAR Secondary Duration MSB 0 - 255  5 UCHAR Secondary Duration LSB 0 - 255  6 D7 (unused) 0  6 D6-D0 Input 0 - maximum Input number  7 D7 P  7 D6 W  7 D5 G  7 D4 E  7 D3 J  7 D2 F  7 D1 R  7 D0 L</p> <p>Field Value Description  Primary 0-65535 For single pulse operation, this shall determine the number of 'ticks'</p>	
--	--	---	--

	<p>Duration preceding the pulse. For continuous oscillation, this shall determine the length of the first portion of the cycle. The output value will be controlled by the 'J' field value.</p> <p>Secondary 0-65535 For single pulse operation, this shall determine the number of 'ticks'</p> <p>Duration the pulse is active. Subsequent to the secondary duration, the output shall return to the state set according to the most recently received Set Outputs command. For continuous oscillation, this shall determine the length of the active (second) portion of the cycle; a 0 value will hold the output state until otherwise configured. The output value will be controlled by the 'J' field value.</p> <p>P 1 The output is configured for single-pulse operation. Once complete, no further output changes will be generated.</p> <p>0 The output is configured for continuous oscillation.</p> <p>W 1 Action is triggered by the specified input. Triggered complex output shall commence within 2 ms of the specified input signal meeting the requirements set by the 'R' field value.</p> <p>0 Operation shall begin within 2 ms of the command receipt.</p> <p>G 1 Operation shall be gated active by the specified input.</p> <p>0 Gating is inactive.</p> <p>E 1 Enable complex output function for this output</p> <p>0 Disable complex output function for this output</p> <p>J 1 During the primary duration, the output shall be written as a logic '1'. During the secondary duration, the output shall be written as a logic '0'.</p> <p>0 During the primary duration, the output shall be written as a logic '0'. During the secondary duration, the output shall be written as a logic '1'</p> <p>F 1 Trigger or gate taken from Filtered Inputs</p> <p>0 Trigger or gate taken from Raw Inputs</p> <p>R 1 (Falling edge) For triggered output, the output shall be triggered by an ON-to-OFF transition of the specified input and shall be triggered immediately upon command receipt if the input is OFF. For gated output, the output shall be active while the input is OFF.</p> <p>0 (Rising Edge) For triggered output, the output shall be triggered by an</p>	
--	---	--

	<p>OFF-to-ON transition of the specified input and shall be triggered immediately upon command receipt if the input is ON. For gated output, the output shall be active while the input is ON.</p> <p>L 1 The OFF to ON transition of the LINESYNC signal shall be used for the time ticks.</p> <p>0 The leading edge of the 1 KHz clock shall be used for the time ticks.</p> <p><b>7.8.5.7.2 Status Format</b></p> <p>The response Status field has the following bit assignments or values.</p> <p>Bit Description or Value  D7-D1 (reserved) 0  D0 Error</p> <p><b>7.8.5.7.3 Actions</b></p> <p>There is a limit of at most 8 outputs that can be configured for control by both the Configure Input Tracking and Configure Complex Output commands. The following algorithm is used to process the Configure Input Tracking command.</p> <p>The entries are processed in sequence, with the requested configuration changes applied in the order they appear in the command. If after processing the entries there are more than 8 outputs configured either Input Tracking and Complex Output, or an out or range input or output signal number was specified in the configuration information, then the original configuration values will be restored and a response sent with the Error bit set. The actions required by configuration changes will take effect within 2 milliseconds of the command reception.</p> <p>If the command Count field value is 0 then all existing complex output functions are removed. Enabling or disabling any individual output for complex output will remove any existing input tracking for the specific</p>	
--	---	--

	<p>output. When the complex output function for an output is removed or disabled, the output value will change to the value specified by the last Set Output command. Each time a command is processed all timing (i.e. - tick counting) for the output is reinitialized.</p> <p>If the G (gating) bit is set to 1 then the W bit (triggering) actions are ignored. If the G (gating) bit is set to 1 and the P (pulse) bit is set to 0 (continuous oscillation), the output is set to "off" or "0" when the gating input changes state and the complex output function disabled. The output will in the "off" or "0" state until the output value is changed by another command.</p> <p>If the P (pulse) bit set to 1, after the secondary duration completes the Complex Output function for this output will be removed and the output set to the most recently received Set Outputs command.</p> <p>If the L (use LINESYNC for ticks) bit is 1 and the LINESYNC Fault status value is 1, then the Complex Output function for this output shall be removed and the output set to the most recently received Set Outputs command.</p> <p>The response Timestamp value will be taken from the current Raw Input Buffer timestamp.</p> <p>***** *****</p> <ul style="list-style-type: none"><li>* This wording captures, I hope, the 'intent' of the complex output.</li><li>* There are several inconsistencies and ambiguities that I have tried to eliminate.</li><li>* 1. this wording should imply that as soon as the command is processed, the outputs will be set to the 'obvious' values controlled by the 'G', 'W', and 'R' bits.</li><li>* 2. I have tried to remove some ambiguities about what the output values are set to when input tracking and complex output are both active. Basically, you can have one or the other or none for an output.</li></ul>	
--	---	--

		<p>* 3. The 'functions' specified with this wording should be 'compatible'  * with the older version in the sense that when using the complex output  * functions for producing pulse and continuous waves the results will  * be the same.  * 4. Note that the 'pulse' function is now really a 'one shot' pulse, and  * that after it does a pulse the output will get set back to the 'default'  * value set by the Set Output command. This will require a bit of sanity  * on the part of users:  *  * Set_output( signal=1, value=0);  * Configure_complex( signal=1, primary=holdoff, secondary=pulselength,  * P=1, J=0 ) --- single pulse, turns ON  *****  *****</p> <p>7.8.5.8 Module Identification</p> <p>The Module Identification command frame will return the PI/O Module Identification value. See ** Module Identification ** for more information.</p> <p>Configure Input Tracking Command</p> <p>Field Value or Format Byte  Type 60 or \$3C 1</p> <p>Configure Inputs Response</p> <p>Field Value or Format Byte  Type 179 or \$B3 1  ID 0-255 2</p>	
P/S I/O	Coughlin	<p>7-1 7.1.1 18 "... shall be interfaced via the ATC Ethernet hub port 4." Should this be enet2, hub2, port 6 -- e.g. the port connected to the Communications Module Connector?  7-2 7.2 3 "Guidance: Parallel I/O for the Type 332 Cabinet ..." There is no "Type 332 Cabinet". Suggest "Model 332 Cabinet".</p>	<p>7-1 7.1.1 18  Agreed and changed</p>

		<p>7-2 7.2.3 "Guidance: ... are intended to operate per the 2070ATC document and CALTRANS TEES." For this document only the ATC 2070 Standard applies. Suggest "... per the ATC 2070 Standard."</p> <p>7-3 7.2.1.3.1 21 "The EIA-485 compliant differential LINESYNC signals shall ..." These differential signals are not required on the Model 332 style PI/O. Suggest deleting this sentence.</p> <p>7-3 7.2.1.3.2 30 "This feature is required to operate with the Model 210 Monitor Unit only. The Model 210 Monitor requires activity ..." The Model 208 Monitor Unit also requires this feature as it needs to see activity within 1.5 s of AC service power restoration. Suggest "This feature is required to operate with legacy signal monitors, which require activity ..."</p> <p>7-3 7.2.1.3.2 36 "More modern monitors have an adjustable power up time, allowing the intersection to remain in FLASH until ..." There are other ITS applications than traffic signals. Suggest "... allowing the controller to boot and the application software to start toggling O39 before the monitor fails."</p> <p>7-6 7.2.1.5.2 21 "All outputs shall not glitch nor change state unless configured to do so." Suggest using the wording from the ATC 2070 document: "All outputs shall not change state unless configured to do so." although "commanded" would be a better verb.</p> <p>7-7 7.2.1.7.1 21, 22 There is no "CPU Module" in the ATC.</p> <p>7-7 7.2.1.7.1 26 "For example, ..." Suggest this entire sentence be converted to guidance, with an additional statement indicating the contrast with the ATC 2070, which requires serial comm via SP5 to its FI/O.</p> <p>7-8 7.2.1.7.1.1 2 "The command frames type values \$70 - \$7F and associated response frame type values \$F0 - \$FF are ..." All other frame types are shown using decimal values in the table immediately following this paragraph. Suggest combining the contents of this paragraph into the table.</p> <p>7-8 7.2.1.7.1.2 15 "Messages 61 / 189, 62 / 109 and 65 / 193 are for ITS Cabinet Monitor Unit." This is not part of this standard. Suggest listing these frames types as "Reserved" in the table immediately preceding this paragraph.</p> <p>7-9 7.2.1.7.2.1 11 "E - indicates a communications loss of greater than 2" Is there a unit for this?</p> <p>7-10 7.2.1.7.4 14 "... leading edge filter specifying the number of consecutive input samples which must be '0' before the input is considered to have entered the '0' state from the '1' state ..." This definition appears to be backwards. Suggest "...</p>	<p>7-2 7.2.3</p> <p>Agreed and changed</p> <p>7-2 7.2.3</p> <p>Agree. Search and replaced all references to TEES.</p> <p>7-3 7.2.1.3.1 21</p> <p>Agree. Corrected</p> <p>7-3 7.2.1.3.2 30</p> <p>Agree. Changed.</p> <p>7-3 7.2.1.3.2 36</p> <p>Agree. Changed</p> <p>7-6 7.2.1.5.2 21</p> <p>Agree. Changed</p> <p>7-7 7.2.1.7.1 21, 22</p> <p>Agreed and changed</p>
--	--	--	--

		<p>leading edge filter ... which must be '1' before ... entered the '1' state from the '0' state ..."</p> <p>7-10 7.2.1.7.4 18 "... trailing edge filter specifying the number of consecutive input samples which must be '1' before the input is considered to have entered the '1' state from the '0' state ..." This definition appears to be backwards. Suggest "... trailing edge filter ... which must be '0' before ... entered the '0' state from the '1' state ..."</p> <p>7-11 7.2.1.7.5 3 "The response frame shall contain 8 or 15 bytes of information ..." Section 7.2.1 applies only to a Model 332 PI/O, which contains only 64 input bits. Suggest "... shall contain 8 bytes of information ...". Also, the byte numbering and the byte descriptions in the response packet should be corrected.</p> <p>7-11 7.2.1.7.6 10 "The response frame shall contain 8 bytes (-2A) or 15 bytes (2B) of information ..." Section 7.2.1 applies only to a Model 332 PI/O, which contains only 64 input bits. Suggest "... shall contain 8 bytes of information ...". Also, the byte numbering and the byte descriptions in the response packet should be corrected.</p> <p>7-13 7.2.1.7.8 13 Section 7.2.1 applies only to a Model 332 PI/O, which contains only 64 output bits. The byte numbering and the byte descriptions in the response packet should be corrected.</p> <p>7-18 7.2.1.12 8 "This is a legacy message command /response for PI/O modules with Datakey resident." There are no ATCs that meet this requirement. Suggest entire section be deleted and the frame type be defined as "Reserved".</p> <p>7-18 7.2.1.13 21 "The identification value response for ITS Cabinet SIUs and CMU shall be (its) frame address." This is not part of this standard. Suggest listing all other values of identification as reserved.</p> <p>7-19 7.2.1.14 1 "6. C1S and C11S pin assignments shown above" Suggest "6. C1S and C11S pin assignments are listed in ATC 2070 Standard.</p> <p>7-19 7.2.1.14 3 "Figure 7-1: C1S and C11S Pin Configuration: Refer to ATC 2070 Standard" Suggest "Figure 7-1: C1S and C11S Layout"</p> <p>7-19 7.2.2.3 19 There are more exceptions than those shown. For example, the Poll Raw Input Data Response contains 15 bytes of information, not 8. Suggest explicitly writing Section 7.2.2 instead of attempting a "specification by exception" which is likely to contain ambiguities and/or errors.</p> <p>7-21 7.2.3.1 16 This section applies to NEMA TS-2 Type 2 PI/O, which are defined in Section 7.2.2. Suggest moving Section 7.2.3.1, "NEMA TS-2 Type 2 PI/O", to (new) Section 7.2.2.5, "Mechanical Details". Also, suggest re-titling Section 7.2.3, from</p>	<p>7-7 7.2.1.7.1 26</p> <p>Agree and changed</p> <p>7-8 7.2.1.7.1.1 2</p> <p>This is a good suggestion. Right now, the 2070 ATC and Cabinet SIU have the same command/respon se descriptions. We are a little concerned describing identical commands differently from document to document. We suggest creating a "Developers Guide", containing all of the "helpful hints" for using the commands.</p> <p>Or -</p> <p>We should update all three</p>
--	--	--	--

		<p>"Mechanical Details" to "Serial Connection to NEMA TS-2 Type 1 Cabinets".</p> <p>7-25 7.4.1 32 " The Engine Board, as well as +5 VDC, +12 VDC and -12 VDC are referenced to the minus of the controller power supply (DCGND1)." Suggest "All signals on the Engine Board, as well as the V_PRIMARY and V_SERIAL power supplies, are referenced to DCGND1."</p> <p>7-25 7.4.2 39 "All parallel inputs and outputs, as well as +12 VDC ISO and +24 VDC are referenced to the minus of the cabinet power supply (DCGND2)." Where is "cabinet power supply" defined? This also implies that both DC supplies can be supplied in one ATC. Suggest "All parallel inputs and outputs, as well as the V_ISO power supply, are referenced to DCGND2."</p> <p>7-26 7.4.3 10 This figure is confusing. It a) mixes the cabinet power supply with ATC power supplies, b) implies that the "F. Panel" and the Engine Board are in a separate unit from the "SP5 Parallel I/O", and c) implies that NEMA PI/Os require +12 VDC ISO.</p>	<p>documents with the same wording.</p> <p>7-8 7.2.1.7.1.2 15</p> <p>After due consideration, we do not want to rule out an ATC based on the ITS architecture.</p> <p>7-9 7.2.1.7.2.1 11</p> <p>Agree. Changed</p> <p>7-10 7.2.1.7.4 14 7-10 7.2.1.7.4 18 7-11 7.2.1.7.5 3 7-11 7.2.1.7.6 10 7-13 7.2.1.7.8 13</p> <p>Previous reply, retain common wording.</p> <p>7-18 7.2.1.12 8</p> <p>Agree and changed.</p> <p>7-18 7.2.1.13 21</p>
--	--	--	---

			<p>Again, after some thought, we decided not to preclude an ATC based on the ITS cabinet architecture.</p> <p>7-19 7.2.1.14 3</p> <p>Agree and changed.</p> <p>7-19 7.2.1.14 3</p> <p>Agree, but again, we will retain common command and response descriptions.</p> <p>7-21 7.2.3.1 16</p> <p>Agree. Changed</p> <p>7-25 7.4.1 32</p> <p>Seems a bit less confusing sticking with the actual power output names.</p>
--	--	--	---

P/S I/O	Rstarr/MN	<p>149. Document: ATC Controller  Section: 7.1.1  Page: 7-1  Paragraph or Item: Parallel Input/Output Overview  Comment: The guidance refers to a high speed computer bus. What is this? Is it the ethernet network to a remote computer? If so, say that. If not, clarify what is intended.</p> <p>150. Document: ATC Controller  Section: 7.1.1  Page: 7-1  Paragraph or Item: Parallel Input/Output Overview  Comment: The guidance says that access to devices on a high speed computer bus interface is via ethernet hub port 4, but Figure 1-1 and figure 7-3 show port 4 going to the engine board, not to the network.</p> <p>151. Document: ATC Controller  Section: 7.2 and subsections  Page: 7-2 thru 7-22  Paragraph or Item: Parallel Input / Output  Comment: Throughout this section, replace reference to a "CPU Module" with "Engine Board", if that is what is intended.</p> <p>152. Document: ATC Controller  Section: 7.2.1 and 7.2.2  Page: 7-2 and 7-19  Paragraph or Item: Parallel Connection to Type 332 Cabinets and NEMA Cabinets  Comment: These introductory sections for the 332 and NEMA parallel interfaces should include some type of overview block diagram showing the relationship of the FCU and Engine Board and which signals are coming and going from where.</p> <p>153. Document: ATC Controller  Section: 7.2.1 and 7.2.2  Page: 7-2 and 7-19  Paragraph or Item: Parallel Connection to Type 332 Cabinets and NEMA Cabinets</p>	<p>Section: 7.1.1  Page: 7-1  Paragraph or Item: Parallel Input/Output</p> <p>See second sentence in guidance.</p> <p>Page: 7-1  Paragraph or Item: Parallel Input/Output Overview</p> <p>Agreed and changed</p> <p>Section: 7.2 and subsections</p> <p>Page: 7-2 thru 7-22</p> <p>Agreed and changed</p> <p>152. Document: ATC Controller  Section: 7.2.1 and 7.2.2  Page: 7-2 and 7-19</p>
---------	-----------	---	--

		<p>Comment: An FCU processor separate from the main processor, along with all the internal signals and interrupts, should be optional for the general ATC controller. It could be required for a specific model of ATC controller, maybe a 3070. The vendor should be allowed to determine how to best distribute processing power internal to the controller and how to implement interrupts, as long as it provides the correct interface to the external cabinet devices and to application software.</p> <p>154. Document: ATC Controller Section: 7.2.1.2 Page: 7-2 Paragraph or Item: Parallel I/O Port Timing Comment: In the 4th sentence, delete the words "of each other". That would imply that it could take 6400 microseconds to assert 64 outputs as long as they were within 100 microseconds of each other. Section 7.2.1.5.2 on page 7-6 correctly states this.</p> <p>155. Document: ATC Controller Section: 7.2.1.3.1 Page: 7-3 Paragraph or Item: Signals and Capacitive Load Comment: Clarify what it is that is presenting a 100 pF to what LINESYNC signal. Here is a place the active voice would help. The LINESYNC signal appears in many places with different items attached to it, such as the engine board, the power supply, the Communications Connector, and apparently some component within the parallel I/O circuitry.</p> <p>156. Document: ATC Controller Section: 7.2.1.5.1 Page: 7-5 Paragraph or Item: Input Scanning Comment: Why does the input scan start at 10 instead of at 1?</p> <p>157. Document: ATC Controller Section: 7.2.1.7 and subsections Page: 7-7 thru 7-18</p>	<p>Previously covered</p> <p>Section: 7.2.1 and 7.2.2 Page: 7-2 and 7-19</p> <p>Previously discussed in working group.</p> <p>Section: 7.2.1.2 Page: 7-2</p> <p>Agreed, and changed</p> <p>Section: 7.2.1.3.1 Page: 7-3</p> <p>A 100 pf capacitor presents 100 pf impedance, LINESYNC input to DCGND1</p> <p>Section: 7.2.1.5.1 Page: 7-5</p> <p>It doesn't start at 10. It starts at</p>
--	--	--	---

	<p>Paragraph or Item: Data Communications Protocols  Comment: These sections define how the ATC applications software talks to the external interfaces. The application software interface to inputs and outputs should be at a higher level than what this describes, and should be covered in the API. These low level software interactions are things that should be provided by the vendor as part of their API implementation and should not be included in the ATC standard.</p> <p>158. Document: ATC Controller  Section: 7.2.1.7.2.1  Page: 7-9  Paragraph or Item: Request Module Status Response  Comment: The status bits R and T refer to an EIA-485, but there is no definition of which 485 is meant.</p> <p>159. Document: ATC Controller  Section: 7.2.1.7.2.2  Page: 7-9  Paragraph or Item: Bit Information  Comment: There is a reference to SCC with no definition as to what that is.</p> <p>160. Document: ATC Controller  Section: 7.2.1.7.7.2  Page: 7-12  Paragraph or Item: Block Number  Comment: The 1st sentence indicates the block number is incremented after each command issued by the CPU Module, but from the discussion it seems it would only be issued after each Poll Input Transition Buffer command, not after other commands. Correct it as appropriate.</p> <p>161. Document: ATC Controller  Section: 7.2.1.9.4 and 7.2.1.10.3  Page: 7-14 and 7-17  Paragraph or Item: Number of Item Field and Data Range  Comment: These sections reference FIOM software, with no definition of what that</p>	<p>I0.</p> <p>Section: 7.2.1.7 and subsections  Page: 7-7 thru 7-18</p> <p>Until there is an API, the commands and responses remain.</p> <p>Document: ATC Controller  Section: 7.2.1.7.2.1  Page: 7-9</p> <p>Agreed and changed.</p> <p>Section: 7.2.1.7.2.2  Page: 7-9</p> <p>Agreed and changed</p> <p>Page: 7-12  Paragraph or Item: Block Number</p> <p>Not sure what</p>
--	--	---

		<p>is.</p> <p>162. Document: ATC Controller Section: 7.2.2.3 Page: 7-19 Paragraph or Item: Functional Requirements Exceptions Comment: In the 1st line replace "identified above" with "of Section 7.2.1 and its subsections" if that is what is intended to be referenced.</p> <p>163. Document: ATC Controller Section: 7.2.2.3 Page: 7-19 Paragraph or Item: Functional Requirements Exceptions Comment: In the last line, delete the word "Ground". Ground is true, not false, and exceeding 16 VDC is not "ground".</p> <p>164. Document: ATC Controller Section: 7.2.2.4.1 Page: 7-20 Paragraph or Item: Monitor Logic Comment: Just define the output and function, not internal gates.</p> <p>165. Document: ATC Controller Section: 7.2.3.2 Page: 7-22 Paragraph or Item: Service Power Connection Comment: The Parallel Connector item indicates a 10 pin connector, but the Service Power Connection cites pin numbers that are not in a 10 pin connector. Change "p" to "C", "U" to "A", and "V" to "H". Also this is missing the logic ground that is on the NEMA connector. Also, the Connector A Pin Assignments section on this page refers to the NEMA standard, but this section just gave the pin assignments.</p> <p>166. Document: ATC Controller Section: 7.3 Page: 7-23</p>	<p>"from the discussion" means. Paragraph is correct.</p> <p>Section: 7.2.1.9.4 and 7.2.1.10.3 Page: 7-14 and 7-17</p> <p>Agreed and changed</p> <p>Section: 7.2.1.9.4 and 7.2.1.10.3 Page: 7-14 and 7-17</p> <p>Agreed and changed</p> <p>Section: 7.2.2.3 Page: 7-19 Paragraph or Item: Functional Requirements</p> <p>Means all Section 7 specifications prior to this sentence.</p>
--	--	--	---

		<p>Paragraph or Item: Figure 7-3  Comment: The internal ethernet hubs should be optional. Most current applications do not utilize ethernet. If ethernet is needed, and if a hub is needed, the ethernet can come out of the controller to an external hub. This would avoid paying for hubs all the time when most of the time they are not needed.</p> <p>167. Document: ATC Controller  Section: 7.3  Page: 7-23  Paragraph or Item: Serial Input / Output  Comment: The traditional use of 2070 serial ports is listed, but no suggestion is made for use of serial ports for TS2. Identify which port should be used for NEMA TS2 Type 1 Port 1. It is important to standardize at least that port and probably TS2 Port 2 also.</p> <p>168. Document: ATC Controller  Section: 7.3  Page: 7-23  Paragraph or Item: Figure 7-3  Comment: Show the Communications Interface on this figure also indicating which port is going to the Communications Interface connector.</p> <p>169. Document: ATC Controller  Section: 7.3  Page: 7-23 and 7-24  Paragraph or Item: Figure 7-3 and surrounding text  Comment: The description for ENET2 says for local cabinet. The description for Port 5 of the ethernet hubs says controller expansion, figure 7-3 for port 5 says internal expansion, and the second description for Port 5 says internal ATC expansion. Figure 1-1 labels it host expansion (although it has it on the wrong port). Clarify whether this is for components internal to the ATC or for connection to other items in the cabinet, and use the same term in each of these 5 places. Also clarify whether it is intended to plug into an external hub or directly into an ethernet device.</p> <p>170. Document: ATC Controller</p>	<p>Section: 7.2.2.3  Page: 7-19</p> <p>Agree and changed</p> <p>Section:  7.2.2.4.1  Page: 7-20</p> <p>We do not understand why this is unclear.</p> <p>Section: 7.2.3.2  Page: 7-22</p> <p>Previous comment</p> <p>Section: 7.3  Page: 7-23</p> <p>Previous working group decision</p> <p>Section: 7.3  Page: 7-23</p> <p>Agree and changed</p>
--	--	--	--

	<p>Section: 7.3 Page: 7-24 Paragraph or Item: Serial Input / Output Comment: The paragraph describing port 2 indicates that "Port 3 does not act as a router". Is this supposed to be port 2 and not port 3?</p> <p>171. Document: ATC Controller Section: 7.3 Page: 7-24 Paragraph or Item: Serial Input / Output Comment: The paragraph describing port 2 indicates that "Port 3 does not act as a router". Change "does not act as" to "is not intended to act as".</p> <p>172. Document: ATC Controller Section: 7.3 Page: 7-24 Paragraph or Item: Serial Input / Output Comment: In the paragraph describing port 2 change the last word from "ATC" to "Engine Board".</p> <p>173. Document: ATC Controller Section: 7.3 Page: 7-24 Paragraph or Item: Serial Input / Output Comment: The paragraph describing port 2 indicates it is intended to be a permanent connection to the network for communications. Normally this would be accomplished by plugging the device into a hub. However, to plug Port 2 into a comm network hub would require a crossover cable or require port 2 to be an uplink. However, Port 3 is the one described as an uplink, but its description is for a laptop, not for an uplink to a network hub.</p> <p>174. Document: ATC Controller Section: 7.3 Page: 7-24 Paragraph or Item: Serial Input / Output</p>	
--	---	--

		<p>Comment: In the 1st paragraph under "Hub 2", in the 1st sentence change "Hub2" to "Port 4" to be consistent with the other paragraphs on Ports.</p> <p>175. Document: ATC Controller Section: 7.4.3 Page: 7-26 Paragraph or Item: Serial I/O Isolation Comment: Label the figure.</p> <p>176. Document: ATC Controller Section: 7.4.3 Page: 7-26 Paragraph or Item: Serial I/O Isolation Comment: SP1, 2, 3, and 7 are on the engine board but are shown here as being isolated from the engine board. Is the figure supposed to be indicating these as being on the Communications Interface connector? If so, label this portion of the figure as Communications Connector.</p>	
P/S I/O	Econolite	<p>Document: ATC Controller Section: Parallel Input/Output (PI/O) Page:7-2 Paragraph: Line 3 Comment: The Guidance statement of this section implies that the text in section 7.2 is still preliminary. If so, this second needs to be updated prior to moving this standard to the next level.</p> <p>Document: ATC Controller Section: 7.2.1.7.1 Protocols Page: 7-7 Paragraph 6 – Line 28 Comment: The word "channe" should be "channel".</p> <p>Document: ATC Controller Section: 7.2.3.2 NEMA TS-2 Type 1 Parallel I/O Connections (Front Panel ) Page 7-22</p>	<p>Document: ATC Controller Section: Parallel Input/Output (PI/O) Page:7-2</p> <p>Guidance Removed.</p> <p>Section: 7.2.1.7.1 Protocols Page: 7-7 Paragraph 6 – Line 28</p>

		<p>Paragraph 2 Line 8  Comment: The Front panel calls for a NEMA Connector A. Then under Parallel Connection a 10 Pin NEMA Connector A is called out. Later in Sub Section Service Power Connection a Connector A refers to Pina, p, U and V which are not included in a ten pin connector. This section needs to properly reference the MS3106 connector and conform to the pin out of TS2-2 section 3.3.4.</p> <p>Document: ATC Controller  Section: 7.3 Serial Input/Output  Page: 7-22  Paragraph:  Comment: This section makes no provision for options regarding any of the serial ports. As such, all sever serial, USB, SPI, and 6 Ethernet ports must be provided on each and every ATC. There should be a mechanism to allow a user to define a minimum sub-set of these ports for applications that do not need the complexity of this many connections. This potentially represents a cost burden for simple applications. The ports can be required for the Engine Board to insure interchangeability but there should be options to allow configuring Host Module with less than a full compliment of these ports and still be compliant to this standard.</p> <p>Document: ATC Controller  Section: 7.3 Serial Input/Output  Page 7-24  Paragraph: Line 1-33  Comment: This section defines requirements for Ethernet Hubs. However, there is no reference in the standard defining the minimum requirements of an acceptable Ethernet Hub. The minimum electrical and performance requirements of the Ethernet Hub should be included in this section or by way of an appropriate normative reference.</p> <p>Document: ATC Controller  Section: 7.4 Isolation Requirements  Page: 7-25  Paragraph: Line 21  Comment: The Isolation Methods statement is a requirement of the standard, not</p>	<p>Agreed and changed</p> <p>Section: 7.2.3.2  NEMA TS-2 Type 1 Parallel I/O Connections (Front Panel )  Page 7-22</p> <p>Agree and changed</p> <p>Document: ATC Controller</p> <p>Section: 7.3 Serial Input/Output</p> <p>Page: 7-22</p> <p>Potential cost burden?</p> <p>We calculated the exact cost burden.</p> <p>Repeating the previous reply on this subject, from the first ATC comment forum:</p>
--	--	---	--

		<p>Guidance. This section should be listed separate from the Guidance as the Guidance statements should be informative not requirements.</p>	<p>"The electronics inside the 2070ATC connecting the 68360 to the SIU or BIU is an opto-isolator and a couple of EIA-485 driver chips. Digikey.com shows the cost of these parts to be less than one per cent of the publically-awarded contract price of the entire 2070L controller."</p> <p>Continuing:</p> <p>"You give us the impression that you can 'significantly' lower the cost of the ATC by 25% or more by using some other architecture. Could you please detail your savings? Specifically, what</p>
--	--	--	---

			<p>else are you eliminating that adds up to so much savings?"</p> <p>Section: 7.3 Serial Input/Output Page 7-24 Paragraph: Line 1-33</p> <p>Agreed and changed</p> <p>Section: 7.4 Isolation Requirements Page: 7-25 Paragraph: Line 21</p> <p>Agreed and changed.</p>
P/S I/O	IL DOT	<p>Section: 7.2.1.10.3 Page: 7-17 Item: Typo. on line 15 Comment: Change the word "wither" to "whether."</p>	<p>Section: 7.2.1.10.3 Page: 7-17</p> <p>Agreed and corrected.</p>
Env & Text	Rstarr/MN	<p>Section: 8.1 Page: 8-1 Paragraph or Item: General Comment: In the 1st sentence, change "First Article Controller Assembly" with "ATC".</p>	

Env & Test	IL DOT	<p>Section: 8.8.3 Page: 8-13 Item: Typo. on line 14 Comment: The wording: "...more than on resonant frequency..." should probably be: "...more than one resonant frequency..."</p> <p>Section: 8.8.4 Page: 8-13 Item: Typo./mistake on line 27 Comment: Reference to "Section 8.8.4, item number 4..." should be: "Section 8.8.3, item number 4..."</p> <p>Section: 8.9.2 Page: 8-14 Item: Typo. on lines 35-36 Comment: Text should read: "2) The 10 G unit is actuated between four to eight times."</p>	<p>8.8.3-8.8.4 page 8-13 typo's have been fixed. 8.9.2 Page 8-14 lines 35/36 consolidated.</p>
Env & Test	Econolite	<p>Document: ATC Controller Section: 8 Environmental and Test Procedures Page: 8-1 Paragraph: Comment: This section is still not clear. There should be a table or other definitive statement showing what tests are required for design qualification or DAT and what tests are required to be run on each and every manufactured unit. In actuality the production tests should be a separate test as they should not be as rigorous as the DAT testing as the design of the product under test has already been proven. Production tests are for quality assurance not design verification.</p> <p>Document: ATC Controller Section: 8.4 Discussed the DAT testing and Production testing. Page 8-3</p>	<p>1. We do state on page 8-3 that DAT is a one time test and all the others are to be done during the production of the unit. 2. We could develop a table, however we are clear when a test is required, i.e. DAT/Production. One thing that</p>

	<p>Paragraph 1 Lines 1-7  Comment: There is a defined difference here between the two types of tests. But in the remaining sections of Section 8 only the DAT test are actually designated. Does that mean that any test not specifically designated as a DAT is a "Production Test" Would it be prudent to define a table with two columns One for DAT tests and One for production tests, with the appropriate tests defined under each column for each test.</p> <p>Also this section also requires that application software for implementing the desired functionality be included with the controller as one of the Major Units of the Controller Assembly. The software operation may have an impact on if and how a controller unit can pass some of the tests outline in this part of the standard. How can we better address this issue being this standard doesn't cover software functionality and in fact the application software may well be supplied by someone other than the vendor supplying the controller hardware?</p> <p>Document: ATC Controller  Section: 8.7.2 Test B:(DAT) Temperature Cycling and Applied Transient test (Power Service)  Page 8-9  Paragraph 1 Line 2-6  Comment: On Page 8-8 Figure 8-1 Test profile graphic refers to notes 1, 2 and 3. These Number notations were left off the notes on Pages 8-9 line 2-6. Just add the note numbers to clarify and match the figure reference.</p> <p>Document: ATC Controller  Section: 8.7.3 Test C:(DAT and Production Testing) Low-Temperature Low -Voltage.  Page 8-9  Paragraph 4 Lines 27-28  Comment: Unfortunately the 100 VAC low voltage is not low enough for the NEMA version of controller (89 VAC is the NEMA LOW) but is sufficient for the 2070 type version. How do we reconcile this low limit to appease both requirements? Do we specify if a NEMA I/O is installed to do this? What if a previously test ATC is converted to a NEMA devices. What is the actual problem with testing to the 89 VAC limit? If that answer is that the ATC -2070 version will not be tested properly, I</p>	<p>may be causing some confusion is that in the 170/2070 world every unit must be Temperature Cycled prior to release from the factory. This is not necessarily true for the NEMA units.  3. Part of the problem here is that NEMA unit has only an application program in it, whereas the 2070 Units may either have a Test program or an application program.  Therefore we thought that we would use the DAT Program being developed by CALTRANS/EAGLE for the Environmental Testing.</p>
--	--	--

	<p>submit that the 100 VAC limit will not test the NEMA device properly.</p> <p>Document: ATC Controller  Section: 8.7.5 Test F:(DAT and Production Testing) High-Temperature Low –Voltage.  Page 8-10 Line 6  Unfortunately the 100 VAC low voltage is not low enough for the NEMA version of controller (89 VAC is the NEMA LOW) but is sufficient for the 2070 type version. How do we reconcile this low limit to appease both requirements? Do we specify if a NEMA I/O is installed to do this? What if a previously test ATC is converted to a NEMA devices. What is the actual problem with testing to the 89 VAC limit? If that answer is that the ATC -2070 version will not be tested properly, I submit that the 100 VAC limit will not test the NEMA device properly.</p> <p>Document: ATC Controller  Section: 8.9. Shock (Impact) Test (DAT/Production).  Page 8-16  Paragraph 1 Line Entire section  Comment: We question the desire to subject every unit to the tests described in section 8.9. Once the DAT unit has been tested and passes this test, each unit manufactured should also pass these same tests. I really do not think that the end user desires his unit to be run over the torture track before he gets it.</p> <p>Later on under sub section 8.9.3 Item #7 “Production testing drop test procedure: while the unit is running, tilt and lift the controller from the front four inches and drop. If this is the only test required for the production unit take out all references to “Production in section 8.9 and add an additional sub-section for the production unit test only.</p> <p>Document: ATC Controller  Section: 8.10 Power Interruption Test Procedure (DAT)  Page 8-16  Paragraph 14 Line 40  Comment: The low limit of 100VAC will not test the NEMA devices properly.</p> <p>Document: ATC Controller</p>	<p>4. We have numbered the NOTES: line 2 (1.) line 3 (2.) and line 5 (3). Also added a Note 4 (after line 7) When testing a NEMA Unit the (LOW) voltage shall be 89VAC in place of 100VAC. All other units will use the 100VAC test level.</p> <p>5. Section 8.7.3 and related document will respond to NEMA type units using the 89VAC level.</p> <p>6. same as above.</p> <p>7. We are doing a drop test on productions to weed out loose connections etc. prior to shipping.</p> <p>8. The method we used is clearly stated.</p> <p>9. again this is covered by 5.</p>
--	--	---

		<p>Section: 8.10.2 Voltage Variation  Page 8-17  Paragraph 2 Line 13  Comment: The low limit of 100VAC will not test the NEMA devices properly.</p>	
Perfor m & Mat'l	Rstarr/MN	<p>178. Document: ATC Controller  Section: 9.1.11.1  Page: 9-3  Paragraph or Item: DIP Switches  Comment: Move "(or silver)" to after "gold" rather than after "brass". I assume you mean to allow silver over brass, not gold over silver.</p> <p>179. Document: ATC Controller  Section: 9.1.11.3 and .4  Page: 9-3 and 9-4  Paragraph or Item: Control Switches and Power Switches  Comment: It seems a little extreme to ask for gold plated contacts on 120 VAC on/off switches.</p> <p>180. Document: ATC Controller  Section: 9.1.12.3  Page: 9-4  Paragraph or Item: Conductor Construction  Comment: 19 strand minimum may difficult on some of the tiny wires that get used inside a controller. Does this include ribbon cables, etc.? No solid wires anywhere?</p> <p>181. Document: ATC Controller  Section: 9.1.12.3  Page: 9-4  Paragraph or Item: Conductor Construction  Comment: The top bullet is missing the "-" for AC-.</p>	This chapter is advisory only. Editorial changes made as requested.
Perfor m & Mat'l	IL DOT	<p>Section: 9.1.6  Page: 9-2  Item: Typo. on lines 25-26  Comment: Sentence does not make sense. Perhaps remove the word "which" from</p>	Revision made.

		the sentence. It will then read: "Capacitors shall be required to meet only their stated ratings."	
Perfor r & Mat'l	Coughlin	<p>9-1 9.1.5.1 34 "No component shall be applied contrary to the manufacturer's recommendations or data sheets." Suggest "No component shall be applied contrary to its manufacturer's recommendations or data sheets."</p> <p>9-2 9.1.5.3 10 "The design life of all components, operating for 24 hours a day and operating in their circuit application, shall be 10 years or longer." Suggest "The design life of each component, operating for 24 hours a day and operating in its circuit application, shall be 10 years or longer."</p>	Changes made as requested.
Perfor m & Mat'l	Econolite	<p>Document: ATC Controller Section: 9.1.2 Edges. Page 9-1 Paragraph 5 Line 13 Comment: We suggest that you change the word "rounded" to "deburred"</p> <p>Document: ATC Controller Section: 9.1.3 Washers, Hinges, Hinge Pins Page 9-1 Paragraph 8 Line 17 Comment: We would like to suggest that the sentence be changed to the following "All washers and hinges shall be non corrosive with stainless steel pins unless otherwise specified."</p> <p>Document: ATC Controller Section: 9.1.4 Electrical Isolation. Page 9-1 Paragraph 10 Line 21 Comment: We question whether MOV devices will with stand the 500 VDC mega-ohm test and should they be only subjected to 100 VDC testing. (CALTRANS testing Documentation refers to MOV and limits the testing to 100 VDC.)</p> <p>Document: ATC Controller Section: 9.1.5 Component Sources Page 9-1</p>	This section is meant to be advisory. Not clear whether these changes should be included here or in procurement specs.

	<p>Paragraph 12 Line 28-30 Comment: We recommend a critical review of this section for compliance with the second sourcing requirement of all components. We realize that CALTRANS has been requiring this for years but it still has not kept parts from being obsolete and new parts are not always available for direct replacement.</p> <p>Document: ATC Controller Section: 9.1.5.2 Operational Envelopes Page 9-2 Paragraph 2 Line 5-7 Comment: We suggest that capacitors be excluded from these requirements.</p> <p>Document: ATC Controller Section: 9.1.7 Resistors Page 9-2 Paragraph 8 Line 37 Comment: We suggest that the 5% tolerance be removed or changed to 500 ppm/degree centigrade.</p> <p>Document: ATC Controller Section: 9.1.8 Semiconductors Page 9-3 Paragraph 2 Line 3 Comment: The EIA requirement excludes special manufactured parts. Do you wish this to happen?</p> <p>Document: ATC Controller Section: 9.1.8 Semiconductors Page 9-3 Paragraph 2 Line 5 Comment: Individual MOS transistors do not have built in static protection do you want to exclude these devices?</p> <p>Document: ATC Controller Section: 9.1.10 Fuses</p>	
--	--	--

	<p>Page 9-3 Paragraph 6 Line 18-19 Comment: The requirement to provide the fuse rating on the holder may not be practical. Would it be possible to require that the "Fuse be clearly labeled on or near the holder"?</p> <p>Document: ATC Controller Section: 9.1.11.1 Dip Switches Page 9-3 Paragraph 8 Line 26 Comment: The requirement "The contacts be gold over brass (or silver)." We would like to reword as following "The contacts shall be silver over brass (or equal)".</p> <p>Document: ATC Controller Section: 9.1.11.2 Logic Switches Page 9-3 Paragraph 9 Line 30-31 Comment: We suggest the following wording change "The switches shall be rated for the circuit it is being used in or a minimum of one ampere resistive load at 120 VAC, whichever is larger, and shall be silver over brass (or equal).</p> <p>Document: ATC Controller Section: 9.1.11.3 Control Switches Page 9-3 Paragraph 10 Line 35-37 Comment: We suggest the following wording change "The switch contacts shall be rated for the circuit it is being used in or a minimum of five ampere resistive load at 120 VAC or 28 VDC, whichever is larger, and shall be silver over brass (or equal).</p> <p>Document: ATC Controller Section: 9.1.11.4 Power Switches Page 9-4 Paragraph 1 Lines 2-4 Comment: We suggest the following wording change "The switch contacts shall be rated for the circuit it is being used in or a minimum of five ampere resistive load at</p>	
--	---	--

		<p>120 VAC or 28 VDC, whichever is larger, and shall be silver over brass (or equal).</p> <p>Document: ATC Controller Section: 9.1.12.1 Harnesses Page 9-4 Paragraph 3 Line 8 In the first sentence reference is made to "external protection" for the harnesses. Did the standard have anything in mind that might further define or limit the use of any particular suggest external protection devices?</p> <p>Document: ATC Controller Section: 9.12.3 Conductor Construction Page 9-4 Paragraph 5 Line 22-33 Comment: We recommend that this requirement be limited to all 22 AWG or large conductors. Also how does ribbon cable fit into this section if at all?</p> <p>Document: ATC Controller Section: 9.1.13.2 LCDs Page: 9-5 Paragraph 2 Line 10-11 Comment: The statement that at low temperature operation the LCD must have a "sufficiently fast reaction time" is extremely subjective and may cause problems when the customer does not feel that the display meets their desires. We need a more objective standard here or delete it entirely.</p> <p>Document: ATC Controller Section: 9.1.14 Connectors Page 9-5 Paragraph: Line 14 Comment: Minimum acceptable standards for the following connectors need to be included in this section as a sub section: D subminiature, RJ-45, RJ-11, and MS3106 (NEMA TS-2, Type 1 A connector.</p>	
--	--	--	--

		<p>Document: ATC Controller  Section: 9.1.14.1 Plastic Circular and M Connectors  Page 9-5  Paragraph 5 Line 21-24  Comment: This section should refer to specific AMP part numbers (or equivalent) as the description of Circular or M type connector is not necessarily universally known.</p> <p>Document: ATC Controller  Section: 9.1.14.2 Flat Cable Connectors  Page 9-5  Paragraph 6 Line 27  Comment: We suggest that the requirement "shall be designed for use with 26 AWG cable" be deleted to allow for any size cable to be used.</p> <p>Document: ATC Controller  Section: 9.1.14.3 PCB Header Socket Connectors  Page 9-5  Paragraph 7 Line 31-34  Comment: We recommend that this section be deleted or be re-written in a manner that describes what is required here.</p> <p>Document: ATC Controller  Section: 9.1.14.4 Metallic Circular Connectors [NEMA]  Page 9-5  Paragraph: Line 37  Comment: The minimum requirements for these connectors should be equivalent to that contained in the TS-2 standard (reference TS-2 section 3.3.5.2.1).</p>	
Quality Control	Econolite	<p>Document: ATC Controller  Section: 10.1.3 Manufacturers' Quality Control Testing Certification  Page 10-1  Paragraph: Line 29-34  Comment: The Guidance portion of this section reads more like a requirement, not guidance. The requirements of this Guidance should be part of the standard and made optional or not included (preference). Also, the statement: "The quality control procedure shall include the following:" has not reference if you assume that the</p>	Guidance under consideration.

		<p>Guidance section is not a requirement. Should this read something like: "If the a quality control procedure is requested by the purchasing agency it shall include the following:"</p> <p>Document: ATC Controller  Section: 10.1.3 Manufacturers' Quality Control Testing Certification  Page 10-2  Paragraph: Line 4  Comment: The 48-hour burn in requirement seems excessive considering the reliability of today's electronic components. We recommend that this requirement be reduced to 24 hours. It should also be clarified if this burn in is at room temperature or at some elevated temperature. We would recommend a 24-hour burn in at a minimum of 70C.</p>	
Glossary		<p>"Guidance" statements are informational only and are not requirements.</p> <p>Should be addressed in Glossary</p>	<p>Glossary extensively revised, but unclear how to incorporate this concept in list of definitions.</p>
Overall	Rstart/MN	<p>COMMENTS ON ATC CONTROLLER STANDARD</p> <p>GENERAL COMMENTS:</p> <p>1. Document: ATC Controller  Section: General Comment  Page: General Comment  Paragraph or Item: General Comment  Comment:</p> <p>A. The effort to include system engineering documentation such as a concept of operations and requirements is good. This should be expanded by adding a requirements traceability matrix (RTM) and/or a Profile Requirements List (PRL), and possibly a new section after the requirements section called a "High Level Design" or "ATC Architecture".</p> <p>B. The High Level Design or ATC Architecture would identify the major components of the ATC, the internal and external interfaces of the ATC, and the "terminators" such as the remote computer, local laptop computer, and interfacing cabinet</p>	<p>These are useful comments but they generally fall outside the original scope of work for the expedited standard development and are now the subject of proposed follow-on work to bring standard into conformance with requirements that were not in place at</p>

	<p>devices. For each component it would describe which functions are performed by that component. For each interface it would describe the purpose of the interface. Then the following sections of the standard would provide the details and lower level design of each of those components as they now do. For example, assuming there is an engine board, the engine board would be one component in the high level design. The later low level design talks about the CPU, memory, real-time clock, etc., on the engine board. It would be similar to figure 1-1, but would also show the serial and parallel interfaces to the cabinet devices and to a remote computer and local computer.</p> <p>C. The RTM or PRL would list each feature from the concept of operations (use cases) and each requirement associated with each feature, and would identify which high level component and associated low level design components satisfy that requirement. The RTM or PRL would also identify which requirements and associated design features are optional versus mandatory, would identify the minimums, maximums, or ranges required and provided, etc. Every requirement should have one or more design features that implement the requirement, and every design feature should be in support of at least one requirement. This RTM or PRL would be how manufactures would identify the options a particular controller model has, and could be how a purchaser would specify which options are desired.</p> <p>2. Document: ATC Controller  Section: General Comment  Page: General Comment  Paragraph or Item: General Comment  Comment: Remove all statements regarding the mandatory or optional status of something from the general text and put these statement in a Requirements Traceability Matrix or Profile Requirements List. Similar with "minimum of", "required", etc. Some statements are in the introduction or the scope or other places that are not where someone would think to look. Having this all in an RTM or PRL would allow the user to have all the option selections listed in one place for easy specifying of equipment.</p> <p>3. Document: ATC Controller</p>	<p>the time of the original procurement.</p>
--	---	--

	<p>Section: General Comment Page: General Comment Paragraph or Item: General Comment Comment: Throughout the document, change the wording from "allow" type wording to "provide" type wording. This occurs in many places. For example, do not say that the ATC "allows operator control of start/stop/run times of all applications", but that the ATC "shall provide means for the operator to start/stop/set run times of all applications". This is especially important in the Requirements section, but should be used throughout.</p> <p>4. Document: ATC Controller Section: General Comment Page: General Comment Paragraph or Item: General Comment Comment: Throughout the document, use "shall" type wording. Some places use words like "is" and "should".</p> <p>5. Document: ATC Controller Section: General Comment Page: General Comment Paragraph or Item: General Comment Comment: Use consistent terms throughout. For example, sometimes a port is called a serial port while in other places the same port is called a communications port, etc. Using different terms causes confusion as to what is intended.</p> <p>6. Document: ATC Controller Section: General Comment Page: General Comment Paragraph or Item: General Comment Comment: This standard should be split out into a general non-hardware prescriptive ATC controller standard and an appendix or separate standard for a specific controller model, perhaps a 3070. The requirements, fit and form, and external interface specifications should be part of the general ATC standard. All of the external interfaces should be optional so the user can purchase what is needed for a specific application. There should be no constraint on the internal design of the</p>	
--	--	--

		<p>general ATC controller. The API is intended to provide some degree of software portability. The 3070 appendix would define the engine board, the communications interface connector, the data key, power supply module, the FCU for the Parallel I/O, the internal ethernet hubs, and other specific design constraints that would make an ATC controller qualify as a 3070 model controller. This would accomplish the purpose of some to standardize a specific controller design while allowing the flexibility for manufacturers to make innovative designs that could be better suited and more cost effective for a particular application. It will help the standard to be accepted and used since users will not be dissuaded by the cost of having to pay for communications interfaces that they will never use.</p> <p>7. Document: ATC Controller Section: General Comment Page: General Comment Paragraph or Item: General Comment Comment:</p> <p>A. Make the following components optional:</p> <ul style="list-style-type: none"><li>- Engine Board</li><li>- Communications Connector</li><li>- Ethernet Ports</li><li>- Data Key</li><li>- USB Ports</li><li>- Ethernet Hubs</li><li>- Ethernet Ports</li><li>- All serial ports (just pick the ones you need for the application)</li><li>- A separate FCU for parallel I/O, and all its internal interfaces and interrupts.</li><li>- A separate power supply module with its indicators and internal signals.</li><li>- LED front panel indicators.</li></ul> <p>If any of these optional items are used they must meet the spec, but it should be allowed to make an ATC without these items.</p> <p>B. A degree of software portability should be by means of the API, not by standardizing the controller hardware to the level contained in this draft standard.</p>	
--	--	--	--

	<p>C. This standard should cover the external interfaces to the cabinet and communications system, and not require a specific design "inside the box".</p> <p>D. Allowing a manufacturer to use innovative hardware designs inside the box while maintaining a degree of software portability through the API will result in less expensive and more reliable hardware. Integrated designs will reduce the number of components and interconnections, thus increasing reliability and decreasing costs. Designs that are modifications of a manufacturer's standard control equipment used in other industrial applications, for example PC104, will bring the years of experience with those designs and will benefit from a larger installed base, increasing reliability and decreasing costs. The prescriptive approach in the draft standard will reduce the number of manufacturers that can provide the hardware, reducing competition and increasing price.</p> <p>E. The standard makes an analogy with the PC industry. However, in the PC industry it is more common to upgrade by replacing the entire PC with a newer, cheaper, better one than to upgrade components of the PC. This is because the manufacturers are allowed to innovate. They are not required to have a separate CPU board, video board, comm port board, network board, memory board, and disk controller board, but can integrate it all into a mother board and sell an entire computer for less cost than upgrading some of the boards.</p> <p>F. If there is a desire to have a controller upgrade by means of upgrading a CPU board, then it would be better to create a 2079 or 2070E and just upgrade the CPU board of that controller rather than to corrupt the concept of a non-hardware-prescriptive ATC controller. If beefing up the 2070 by defining a new CPU board for it (rather than defining a whole new ATC controller as is done here) is not feasible, then it is an indication that using interchangeable CPU boards for performing upgrades is not the best approach to take and is not a good approach for this ATC controller either.</p> <p>8. Document: ATC Controller Section: General Comment Page: General Comment Paragraph or Item: General Comment</p>	
--	--	--









