

				Date March 18, 2004	Document Designation and Title ATC Controller Standard
Name/ Company	Clause, Paragraph Figure/Tab le	Comment Type (T, E, G)*	Comments	Proposed Changes	Resolution of each proposed change
Econolite <i>Ballot 1</i>		General	The proposed standard was predominately developed from the perspective of 170/2070 users. No major NEMA only user was represented on the ATC Joint Committee nor were they drawn into the Working Group. The NEMA standards (TS1 & TS2) represent around 65-70% of the North American traffic controller market place, yet these users did not have a direct involvement in the development of this standard. In many cases, the needs of NEMA users have been ignored, even when comments have been provided (such as regarding controller height and connector pin outs/interfaces, etc.).	No proposed change to standard	<ol style="list-style-type: none"> 1. This is a comment that proposes no specific change to the standard. 2. This is a request regarding Joint Committee membership that is not a technical issue to be resolved by this task group. 3. Task group points out that the City of Anaheim CA is a major NEMA-only user that participated both at the Joint Committee level as well as at the Working Group meeting in San Diego. Harris County, Texas is also a major NEMA user that participated in both at the Joint Committee level and at all of the Controller Working Group meetings.

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Econolite <i>Ballot 2</i>		General	The process used to expedite the development of this standard, in our opinion, compromised the consensus based approach to developing a standard. A contractor team, as apposed to a consensus based working group drove the development of the standard and in addition dispostioned comments. This is in contrast to how contractors have been used to expedite NTCIP standards were the contractor worked at the direction of the working group.		<ol style="list-style-type: none"> 1. This is a comment that proposes no specific change to the standard. 2. This is a policy and process issue to be addressed by ITE, and not a technical issue to be resolved by this task group.
Econolite <i>Ballot 3</i>		General	A number of technical comments have been made by a various vendors during the development of this standard. We feel that a number of these comments had a sound technical base and could affect the viability of the standard. Yet, these comments were rejected by the contractor developing the standard. In some cases, the technical comment clearly pointed out flaws in the wording or design of the standard that would lead to interoperability or interchangeability problems between vendors trying to supply controllers or modules developed to this standard.		<ol style="list-style-type: none"> 1. This is a comment that proposes no specific change to the standard. 2. This task group now has addressed each of the NEMA ballot comments herein. 3. This task group will address comments in addition to these ballot comments, which were submitted prior to the start of the ballot period (as indicated by the email or web log timestamp on the comment). 4. This task group will not address any comments submitted during or after the start of the ballot period (as indicated by the email or web log timestamp on the comment).

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Econolite <i>Ballot 4</i>		General	<p>We feel that the current version of the standard does not provide a controller design that can accomplish one of the key goals of the standard, i.e provide a hardware base that allows software to be interchanged between controllers supplied by different vendors. The lack of an ATC API Standard makes the ATC Controller Standard incapable of accomplishing this goal. As such, we cannot see how the ATC controller standard can be adopted until there is a clear design approach for the ATC API. Without the ATC API or the addition of further design details (such as selection of a common OS, driver definition, etc.) in the ATC Controller Standard there is little chance that software written for the ATC Controller will be able to run on controller hardware supplied from multiple vendors without the software being ported to the hardware requirements of each vendor's ATC Controller. This means that an agency investing in software may be able to only use the software purchase with one particular controller vendor. This problem is exactly what the ATC Controller Standard was supposed to solve.</p>	\	<ol style="list-style-type: none"> 1. The task group recognizes the requirement that an ATC must be able to run all existing software developed for the 2070ATC, via recompile of legacy source code. 2. Task group proposes rewriting Section 2.2.5 to include the philosophy of the Board Support Package (BSP) to maintain interchangeability among vendors, and to provide compatibility with existing 2070 ATC software. A BSP shall be required by each ATC vendor, listing tools and instructions for software developers to compile source code into ATC executables. Each vendor's BSP shall further provide specific instructions to software developers for recompiling existing 2070 ATC source code into ATC executables. 3. Task group proposes Section 2.2.2: reference the BSP instead of the OS. 4. Task group proposes the addition of a new section within the standard describing the BSP. 5. Task group proposes to eliminate all references to API within this ATC standard. 6. Task group proposes Authorized Engineering Information outside of the standard stating that the resulting API shall run on controllers designed to this ATC standard. 7. Task group proposes related modifications to Diagram 3.1.

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Econolite <i>Ballot 5</i>		General	The standard as written does a good job of targeting high end controller requirements. However, many users will not have a use for many of the features, such as the large number of communications ports included in the hardware requirements. The standard provides vendors little flexibility in providing optional implementations or "lite" versions of the ATC Controller that reduce end user cost by providing only those features that are truly needed by the end user.		<p>1. This is a comment that proposes no specific change to the standard.</p> <p>2. Task group recognizes that the 2070 ATC is the first in a family of ATCs and that this standard is the second in that family. Task group recognizes that there is a need for future ATC versions. Adoption of this specification does not preclude future version of the ATC which would address optional features.</p>
Econolite		General			

* Technical, Editorial, or General

				Date	Document Designation and Title
				3/24/04	ATC v. 5.0
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Richard W. Denney, Jr., P.E./Iteris <i>Ballot 6</i>	Entire Document	G	One of the clear user needs for the ATC is to provide software portability from controller to controller, despite who manufactured the controller hardware. The ATC proposes to achieve this portability by use of application program interfaces that are standardized. I am concerned that these API's may impose requirements on the design of the ATC, and therefore I do not think the standard as balloted demonstrates that this user need has been met, until the API has been defined sufficiently to be sure the current ATC standards will implement it.	Withhold action until the standard demonstrates that it meets user needs, even if that means other standards are in place before action on this standard. This may also require formally documenting user needs and requirements so that the standard can be demonstrated to satisfy them.	1. Task group interprets this comment to be resolved in <i>Ballot 4</i> comment above.
Richard W. Denney, Jr., P.E./Iteris <i>Ballot 7</i>	Entire Document	G	I have been informed by several ATC JC members that this document was presented for ballot without all the user comments being fully addressed.	Withhold action until all user comments are formally disposed.	1. This is a comment that proposes no specific change to the standard. 2. Task group interprets this comment to be resolved in <i>Ballot 3</i> comment above.
Richard W. Denney, Jr., P.E./Iteris <i>Ballot 8</i>	Entire Document	G	There have been complaints that the ATC Working Group does not contain fair representation within the industry.	Withhold action until the working group demonstrates membership fairly representing users and manufacturers.	1. This is a comment that proposes no specific change to the standard. 2. This is a policy and process issue to be addressed by ITE, and not a technical issue to be resolved by this task group.

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Tim O'Leary Peek Traffic	Referenc es are to page numbers and lines (documen t has every line numbered)				
<i>Ballot 9</i>	General	G	Proposed standard is strongly centered around the 170/2070 Users, yet approximately 70% of intersections are currently controlled by NEMA controllers. Approval of this standard therefore endorses the 170/2070 world over the NEMA (majority) world. This will send a bad message to the NEMA users.	Retract proposed standard and rework it to be more in-line with current accepted NEMA standard. For example, do not define the internal connections and inter-module protocols, etc but rather define the external interfaces and required functionality.	<ol style="list-style-type: none"> 1. Task group interprets this comment to be resolved in <i>Ballot 1</i> comment above. 2. Task group points out that the 2070 ATC has been adopted by NEMA. 3. Task group points out that the ATC internal connection are <u>not</u> defined, except the 2070 ATC modem and engine board pin out. This "loosening" of the ATC standard, as compared to the 2070ATC, was done in response to the suggestions of NEMA members.

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<i>Ballot 10</i>	General	T	<p>Proposed standard attempts to target the most sophisticated and demanding users, while ignoring the fact that 90% or more of the users would easily use less than 50% of the requirements in the products life-time.</p> <p>The standard should allow for a completely "integrated" version of the ATC provided it can accept (be upgraded to) a standard engine board. Installation of a standard engine board should transfer control to the engine board.</p>	<p>Specifically identify within the standard two versions: a "full" and a "lite". The "lite" should specify one Ethernet port (and no hub), four serial ports total (includes communications), SPI (host EEPROM ... to allow a full engine board to identify what capabilities the host unit has) but Datakey optional, the communications slot being optional, and allow either the use of an integrated "engine board" (on the "host" board) or a non-integrated standard engine board. Additionally, a "lite" version of the engine board should be included, but the unit should accept and correctly function with a "full" engine board installed. To support recognition of an engine board, an "engine board present" pin needs to be allocated to one of the engine board connectors (suggest selecting of of pin 34-38 on connector P1). The "lite" should only require (specify) the engine board as an interchangeable module, with all other interfaces defined strictly as physical external connections and their required functionality. Lastly, a "lite" ATC shall allow for integrated I/O and User interfaces provided the manufacturers provide software interfaces that are transparent to the application program (Note: cannot reference the API since it does not "exist").</p>	<ol style="list-style-type: none"> 1. Task group interprets this comment to be resolved in <i>Ballot 5</i> comment above. 2. Task group is investigating the specific reason for proposing an "Engine Board Present" pin, as no specific need was listed in the comment text.

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<i>Ballot 11</i>	General	T, G	This standard has been created under the premise that the Users' existing 2070-6x and 2070-7x modules can be used (otherwise there would have been NO requirement to replicate the form factor, pin-out, etc). This is not true. It is questionable whether any do NOT meet this requirement (for disabling their drivers after 10 bit periods). Under the impression that it was a User requirement to reuse the existing 2070-6x/7x modules.	Either 1) remove requirement to support existing 2070-6x/7x modules, or 2) remove requirement for disabling line drivers are 10 bit periods of inactivity.	<p>1. Task group points out that the requirement of a 10 bit period was eliminated from the proposed standard before the NEMA ballot.</p> <p>2. Task group point out that all of the 2070 ATC modems are compatible with this standard as written.</p> <p>3. Task group recommends that if a second modem is added, it must conform to the 2070 ATC slot A1.</p>
<i>Ballot 12</i>	General	T	Lack of software portability. Users are expecting that they will be able to move/install the same software across various manufacturers' products. Without more specific hardware definitions this will not be possible, even if the API were available.	This is a big dilemma ... does one specify the hardware completely to achieve the desired portability (similar to the 2070 approach) or does one accept that software will be expensive to port across products. The Users need to specify their requirements and not the manufacturers. Resolution deferred to the Users (both NEMA and 170/2070).	1. Task group interprets this comment to be resolved in <i>Ballot 4</i> comment above.
<i>Ballot 13</i>	General	T	There is no complete chassis ground to such items as faceplates of the communication modules. It appears that the standard is counting on knurled thumbscrews that the User may or may not use (as seen in the field). This problem is compounded if a non-metallic material is user for some of the chassis. Additionally, most metallic surfaces are coated or painted and a reliable conductive path is not available. UL would probably reject such equipment as unsafe.	<ol style="list-style-type: none"> 1) Add "equipment ground" to the communication module backplane and require that the faceplate be connected to it. 2) Require that ALL external conductive (e.g. metallic) surfaces be connected to equipment ground. 	<p>1. Task group points out that UL 508 requires significant physical separation of equipment ground from all other signals, contrary to the NEMA practice of routing equipment ground amid the sensitive backplane signals, and adjacent to signal pins on connectors.</p> <p>2. Task group recommends using NEMA grounding method per TS-2, not UL 508, as the two standards conflict.</p>

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<i>Ballot 14</i>	General	E	There are too many comments of an editorial nature where the authors attempt to justify their decisions, the scope of the section, etc. This is not typical of previous NEMA standards, and may not reflect the opinions of the NEMA members.	Remove such editorial comments from the standard.	1. Task group agrees, and recommends ITE remove all editorial commentary.
<i>Ballot 15</i>	General	G, T	Standard provides specifications for products that are NOT typical in U.S. installations, but rather are based on similar, non-compatible European standards. For example, 19,200 baud modems regularly deployed in U.S. are not Di-Phase and therefore non-compliant	Change the standard to reflect products & technologies typical in U.S. installations. Please contact GDI for further details.	1. Task group points out that the di-phase modem is sold by US modem companies and is used extensively in US traffic signal control systems. 2. Task group recommends retaining the di-phase modem, plus adding the GDI 19,200 bps FSK to the ATC standard.
<i>Ballot 16</i>	1-1 (lines 31-34)	G	Observation of the "process" followed by the contractor team does not appear to be consistent with NEMA's normal procedure for Standards Development at the time of contract award. It appears that the process has been altered as the contract has progressed. For example, the ATC Controller Working Group did not dispose of the comments received during the User Comment period; the Contractor unilaterally handled all comment dispositions and did not make all of their answers available within the necessary (defined) period prior to ATC JC voting (NEMA requires two weeks).	ATC controller WG should dispose of comments not the contractor. This should be retroactive to ALL comments ever submitted. During votes at the Working Group level, each organization should be limited to one vote. (During the development of this proposed standard, the contractor had numerous attendees to the point that any vote was practically guaranteed to go their direction). Also, need to review process and dates and verify that NEMA standard development procedures have been adhered to.	1. This is a comment that proposes no specific change to the standard. 2. This is a policy and process issue to be addressed by ITE, and not a technical issue to be resolved by this task group.

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<i>Ballot 17</i>	2-1 (lines 26-27)	T	Functional Requirements identified in Section 4 is not a complete list of USER requirements. Do not develop the technical requirements first.	First develop a complete list of USER requirements, and then develop the technical requirements based on them. For example, the USER requirement for an interchangeable power supply (as stated at the Traffic Signal Workshop in Seattle, WA in July 2003) and graphical display capabilities have been missed.	<p>1. Task group points out that the ATC standard already requires a modular power supply.</p> <p>2. Task group points out that the ATC standard does not preclude a graphics display, but would require the inclusion of a simple graphics software interface, which is being investigated.</p> <p>3. Peter Ragsdale has been assigned the task of proposing a simple graphical software interface.</p>
<i>Ballot 18</i>	2-1 (lines 27-29)	T	"Plug-in compatibility" is misleading as it does not include functional compatibility. For example, one may have two Spread Spectrum Radio communication cards from different manufacturers both of which operate in the 900 MHz band using frequency hopping technology; there is no guarantee (in fact it is highly unlikely) that the two will be able to communicate to each other.	Change wording to clarify that although modules may be interchangeable between manufacturers, that it is highly probable that they will not provide equivalent functionality. This applies to both communication modules and the engine board (i.e. one cannot move application software from one manufacturer's engine board to another as is currently possible in the 2070).	1. Task group recommends the removal of the sentence.
<i>Ballot 19</i>	2-3 (lines 22-23)	E	Comment on ITS Cabinet Standard	Remove "(standard concurrently in design)"	1. Task group recommends the removal of the sentence.
<i>Ballot 20</i>	2-3 (line 38)	T	There are no designated minimum requirements on the "Operating System Software" anywhere in the document	Remove line 38 on page 2-3 completely.	1. Task group recommends the removal of the sentence.

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Ballot 21	2-4 (lines 11-12) 7-1 (lines 33-34)	T, G	This requirement hampers the utilization of future technological advances that WILL occur during the lifespan of this standard	Remove the sentence "In this standard user interfaces not specified here as minimum or optional are considered non-compliant". Place the requirement that alternative user interfaces may be included provided that the minimum or an optional interface is provided also. Update page 7-1 similarly.	1. Task group recommends 7.1.1 and 2.2.3 be rewritten such that alternative user interfaces may be included, provided that the minimum or an optional interface is provided also.
Ballot 22	2-4 (lines 27-37)	T, G	As discussed (and agreed upon) at the ATC JC meeting, references to the API need to be removed since it is not at the same point in its development as this standard. This section is extremely misleading to users, etc as there is NO requirement for the ATC to currently support the API (now or in the future).	Either 1) remove section 2.2.5 completely, or 2) delay approval of this standard until AFTER the API is balloted and approved (in this case this proposed standard will need to be reviewed to ensure that it can support the API requirements). Also request that it be resubmitted for User Comment since this will be a substantial change from the Users point of view.	1. Task group interprets this comment to be resolved in <i>Ballot 4</i> comment above.
Ballot 23	2-5 (lines 4-8)	T, G	API is not at the same development stage as this proposed standard and hence cannot be referenced normatively, nor can any form of support for the API be mentioned or inferred.	Either 1) remove all references to the API draft standard completely, or 2) delay approval of this standard until AFTER the API is balloted and approved (in this case this proposed standard will need to be reviewed to ensure that it can support the API requirements). Also request that it be resubmitted for User Comment since this will be a substantial change from the Users point of view.	1. Task group interprets this comment to be resolved in <i>Ballot 4</i> comment above.
Ballot 24	2-5 (lines 13-14)	E	NEMA TS2-2002 is approved.	Remove text "(pending NEMA approval)"	1. Task group recommends removing the text.

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<i>Ballot 25</i>	2-6 (lines 3-4)	T	This standard does not truly support the identification of communication modules properly.	Either 1) change statement to reflect communication module support capabilities (either does not offer support or support is limited to information entered into ATC by User), or 2) (preferred) add SPI signals to the communication slot(s) to facilitate automatic reading of communication module details and require that all communication modules support this feature.	1. Task group recommends removing the sentence, unless the specific NTCIP standards are identified.
<i>Ballot 26</i>	3-1 (line 26)	T, G	Standard states "... yet must be designed in a cost-effective manner." The standard has many costly requirements without any analysis of the minimum hardware requirements of the majority of intersections in this country. A standard that only addresses the high end of the requirements cannot be considered cost-effective for the majority of users.	Either remove high-end functionality or make it optional such that cost-effective designs that meet the vast majority of Users can be created (e.g. standard contains the requirement for ATC's to contain two independent Ethernet channels, each with its own four port hub.)	1. Task group recommends removing the term "cost effective"
<i>Ballot 27</i>	3-5 (lines 1-7)	T, G	Standard states "...is particularly interested in addressing the longevity concerns surrounding the ATC 2070..." The standard largely ignores the needs of the majority of users (NEMA-based) in favor of a 2070-based design with some NEMA add-ons.	Revise standard to more accurately support the needs of the existing NEMA Users. This also requires getting NEMA User participation on the ATC JC an Controller Working Group (practically everyone involved is either a 170/179/2070 User or manufacturer).	1. Task group recommends removing the sentences.

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<i>Ballot 28</i>	3-5 (line 24)	T, G	Standard states "An additional need for the ATC is improved network communication interface support." Has any actual study been done of the number of stand-alone intersections vs. interconnected intersections in this country?	Modify the standard based on the result of an actual (factual) study.	1. Task group recommends removing the sentences.
<i>Ballot 29</i>	3-6 (lines 4-12)	T, G	Standard states "Cost-effective design is also a goal..." Requiring a separate engine board reduces reliability (100 pins adds 100 failure points) and increases costs for all possible hardware designs. For the example given (Personal Computers), separate motherboard and CPU boards do not exist in the general market place, and where they are used the relative cost is 3 to 4 times higher.	Re-evaluate the standard in terms of cost-effectiveness, and reduce where necessary. ITE process prevents discussing and/or including cost factors in a standard, but we must ensure that reasonably priced products will be available, especially when the FHWA may tie funding availability to utilizing equipment that adheres to the standard.	1. Task group recommends removing the sentences.
<i>Ballot 30</i>	3-6 (lines 14-21)	T, G	Standard states "Need exists for CPU upgrade and interchangeability between manufacturers." The majority of intersections have been running for years (decades) without the need for CPU upgrades. NEMA has provided interchangeability between manufacturers via standardized external connectors. The real User goal is not being met by this standard.	Change the standard to reflect the "true" User requirement ... that of standardized external connectors, and the inclusion of a defined, standardized API. This approach will remove the majority of the standard that reflects the internal components and their interactions. This will reduce cost, increase reliability, and provide for software portability. Note that the standard itself states that the internal components are not interchangeable among manufacturers, and yet there are significant internal interfaces specified.	1. Task group recommends removing the sentences.
<i>Ballot 31</i>	4-1 (line 32)	T, E	Reference made to non-existent API	Change "API" to "operating system"	1. Task group interprets this comment to be resolved in <i>Ballot 4</i> comment above.

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<i>Ballot 32</i>	4-2 (line 9)	T, E	Reference made to non-existent API	Change "APIs" to "operating system"	1. Task group interprets this comment to be resolved in <i>Ballot 4</i> comment above.
<i>Ballot 33</i>	4-2 (line 25)	T, E	Reference made to non-existent API	Change "API" to "operating system"	1. Task group interprets this comment to be resolved in <i>Ballot 4</i> comment above.
<i>Ballot 34</i>	4-3 (lines 13-14)	T, E	Reference made to non-existent API	Remove lines 13 and 14 completely.	1. Task group interprets this comment to be resolved in <i>Ballot 4</i> comment above.
<i>Ballot 35</i>	4-3 (lines 30-31)	T, E	Reference made to non-existent API	Remove lines 30 and 31 completely.	1. Task group interprets this comment to be resolved in <i>Ballot 4</i> comment above.
<i>Ballot 36</i>	4-4 (lines 7-8)	T, E	Reference made to non-existent API	Remove lines 7 and 8 completely.	1. Task group interprets this comment to be resolved in <i>Ballot 4</i> comment above.
<i>Ballot 37</i>	4-4 (lines 22-23)	T, E	Reference made to non-existent API	Remove lines 22 and 23 completely.	1. Task group interprets this comment to be resolved in <i>Ballot 4</i> comment above.
<i>Ballot 38</i>	4-4 (line 33)	T, E	Reference made to non-existent API	Change "API" to "operating system"	1. Task group interprets this comment to be resolved in <i>Ballot 4</i> comment above.
<i>Ballot 39</i>	Page 4-5 line 28 to Page 4-6 line 4 inclusively	T, G	Without a finished API standard, one cannot ensure or claim that this standard supports it completely. As agreed at the ATC JC, such references to the API need to be removed.	Remove this section completely.	1. Task group interprets this comment to be resolved in <i>Ballot 4</i> comment above.
<i>Ballot 40</i>	4-6 (lines 23-25)	T, E	The ITS cabinet is complete. Also, both the ITS and 332 cabinets require rack-mounted controllers.	Change text to read "If used in standard NEMA TS1 or TS2 cabinet, the controller unit shall be shelf mounted."	1. Task group recommends correcting this typographical error, as ATC may be shelf-mounted
<i>Ballot 41</i>	4-6 (line 40)	T	Section 5 does NOT designate minimum Engine Board requirements on "operating system software"	Remove line 40 completely.	1. Task group recommends removing line 40 completely.

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<i>Ballot 42</i>	4-6 (line 28) – 4-7 (line 4)	G	Engine Board Contents. Engine board interoperability is dubious – any additional interfaces added by a manufacturer, such as an interface to drive a graphic LCD, will preclude the use of any other manufacturer’s engine board.	Modify standard throughout to reflect that enhancements by a manufacturer may prevent interchangeability (the standard states that enhancements are allowed).	1. Task group recommends changing “Interoperable” to become “interchangeable”
<i>Ballot 43</i>	5-1 (lines 14-15)	T, G	Software is NOT compatible and portable as Users have been lead to believe.	The terms “compatible” and “portable” need to be explicitly defined so that Users are aware that and software will (most likely) require recompilation, and porting efforts to be performed. These efforts may include procurement of different Operating System development tools, cross-compilers, etc. Also request that it be resubmitted for User Comment since this will be a substantial change from the Users point of view.	1. Task group recommends the standard define and clarify the terms “compatible” and “portable”, and then add the definitions to the standard in the glossary and section 2.
<i>Ballot 44</i>	5-1 (line 40)	T, G	The ATC-2070 specifies 2070-1A and 2070-1B CPU modules only. The engine board does not appear to be “built” upon these CPU platforms as specified.	Remove line 40 completely.	1. Task group recommends rewording the line to become “build on the experience of the 2070-1A and -1B CPUs”
<i>Ballot 45</i>	5-2 (lines 9-10)	T, G	One cannot reference the “upcoming ATC API” standard since it is not at a suitable stage in its development yet.	Remove lines 9 & 10 completely.	1. Task group interprets this comment to be resolved in <i>Ballot 4</i> comment above.

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<i>Ballot 46</i>	5-2 (line 24) 5-3 (lines 1-2)	T	The standard should not specify the "nominal thickness" of the PCB material. This should be left up to the engineers and be based on their requirements.	<p>Change the line to either read 1) "The minimum nominal thickness of the PCB material shall be 0.062". Thicker materials may be used as required provided that the resulting engine board envelope remains within the overall dimensions specified in this standard." or 2) (preferred) "The thickness of the PCB material shall be such that the rigidity and strength of the PCB are at a minimum equivalent to that of 0.062" thick FR4 material. The resulting engine board envelope shall remain within the overall dimensions specified in this standard."</p> <p>Also affected are lines 1-2 on page 5-3. These lines should be changed to read "... and shall not exceed 0.742" on the top including the Engine Board PCB material thickness."</p>	1. Task group points out that this was already accepted by Joint Committee, but was not changed in the standard.

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<i>Ballot 47</i>	5-2 (lines 34-37)	T, G	There is no technical or User requirement that the height between the engine board and the host must be as specified. The REAL requirement is that the engine board overall envelope cannot be exceeded and that the host module/device can accommodate such an engine board. The standard as it exists prevents manufacturers from providing more or less space between the engine board and host board as may be required for such reasons as thermal heat dissipation, mechanical fit, etc. For example, one may need/desire 0.500" of clearance between the Host Module components and the Engine Board envelope.	Change lines 34-37 to read "The assembled distance between the Engine board and the Host Module shall provide a minimum of 0.100" of clearance between the Engine Board envelope and any components on the Host Module (including the actual Host Module PCB).	1. Task group points out that this was already accepted by Joint Committee, but was not changed in the standard.
<i>Ballot 48</i>	5-6 (line 18)	T	Minimum MIPS should be in the 50-60 MIPS range. As agreed at the July 2003 ATC Controller Working Group meeting in San Diego, the contractor was to review available (suitable) processors and select a minimum MIPS rating between 50 to 60 MIPS. 80 MIPS is outside of this range and eliminates both existing traffic products (from other manufacturers) and potential, cost-effective processors from being considered. The standard is forcing a luxury ATC device to be designed.	Change the MIPS rating to be a minimum of 60 MIPS (i.e. the highest minimum value agreed to by the working group).	<ol style="list-style-type: none"> 1. Task group recommends a change to 60 MIPS. 2. Task group recommends that the bus width and wait states for SRAM and FLASH as described in the standard are correct, and recommends no changes. 3. Task group recommends allowing bus width and wait states for DRAM be reduced to 16 bits as a minimum. However, if the native bus width and zero wait states are not used in the engine board design, vendor must publish DRYNSTONE test results to prove that the MIPS requirement is met.

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<i>Ballot 49</i>	5-6 (line 14)	T	A lite (normal version that satisfies the majority of the users' requirements) version of the ATC does not require this much FLASH for application program storage.	Add a new requirement of 2MB of FLASH application program storage for a "lite" version. (Aside: most programs use less than 1MB, some less than 512KB).	1. Task group interprets this comment to be resolved in <i>Ballot 5</i> comment above.
<i>Ballot 50</i>	5-6 (line 25)	T	Typical applications do not require this much DRAM now or in the foreseeable future. The 2070ATC standard only requires 4MB, but this is being increased to 8MB. A manufacturer could install more at their option or if required by a specific application.	Change minimum DRAM for a full engine board to 8MB and add a new requirement of only 4MB for a "lite" ATC. I.e. the standard should state reasonable minimums, not those that satisfy 100% of cases.	1. Task group interprets this comment to be resolved in <i>Ballot 5</i> comment above.
<i>Ballot 51</i>	5-6 (line 32)	T	Applications do not require this much SRAM now or in the foreseeable future. Both the latest Caltrans 2070 spec (including the October 28, 2003 errata) and the 2070ATC standard only require 512KB. As Caltrans increased all other memory requirements in the October 28, 2003 errata except SRAM, this further indicates that not more than 512KB of SRAM is required. A manufacturer could install more at their option or if required by a specific application.	Change minimum SRAM to 512KB (for both the full Engine Board and the "lite" ATC). I.e. the standard should state reasonable minimums, not those that satisfy 100% of cases.	1. Task group interprets this comment to be resolved in <i>Ballot 5</i> comment above.
<i>Ballot 52</i>	5-7 (line 36)	T	SRAM on an ATC-lite using an integrated engine board needs to have a standby power source.	Add the following to the end of line 36 "The SRAM on an ATC-lite shall be maintained by an appropriate standby power source."	1. Task group interprets this comment to be resolved in <i>Ballot 5</i> comment above.

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<i>Ballot 53</i>	5-8 (lines 8-14)	T, G	This standard cannot require compliance with a standard that is still under development and not at the same level of completion. I.e. this standard cannot require that "... be capable of providing the required functionality in its entirety as defined by the ATC API".	Remove section 5.3.5 completely. No reference or requirement can be made that devices compliant to this standard shall support the API.	1. Task group interprets this comment to be resolved in <i>Ballot 4</i> comment above.
<i>Ballot 54</i>	5-12 (lines 7-8)	T	The port is supposed to mimic the 2070 SP1 functionality which does not support the values of 57.6k and 115.2k.	Remove 57.6k and 115.2k from the list.	1. Task group recommends that these two rates become optional. 2. Task group recommends that a note be added, pointing out that all ports are not expected to operate at maximum speed simultaneously.
<i>Ballot 55</i>	5-12 (lines 23- 24)	T	The port is supposed to mimic the 2070 SP2 functionality which does not support the values of 57.6k and 115.2k.	Remove 57.6k and 115.2k from the list.	1. Task group interprets this comment to be resolved in <i>Ballot 54</i> comment above.
<i>Ballot 56</i>	5-12 (lines 38- 39)	T	The port is supposed to mimic the 2070 SP3 functionality which does not support the values of 57.6k and 115.2k.	Remove 57.6k and 115.2k from the list.	1. Task group interprets this comment to be resolved in <i>Ballot 54</i> comment above.
<i>Ballot 57</i>	5-13 (lines 7-8)	T	The port is supposed to mimic the 2070 SP4 functionality which does not support the values of 57.6k and 115.2k.	Remove 57.6k and 115.2k from the list.	1. Task group interprets this comment to be resolved in <i>Ballot 54</i> comment above.

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<i>Ballot 58</i>	5-13 (line 16)	T	Although in disagreement with the requirement of matching 2070 functionality on these serial ports, in order to be compatible with the ATC2070 specification SP5 needs to support asynchronous communications at 1.2, 2.4, 4.8, 9.6, 19.2, and 38.4 kbps.	If this port is to duplicate of 2070 functionality, then the asynchronous mode and baud rates need to be supported.	<p>1. Task group points out that 2070 ATC SP5 has been used only for synchronous communications to the Field I/O and has never been used in the asynchronous mode by legacy software applications. Therefore, the added complexity of asynchronous SP5 with flow control signals is not included in the ATC standard.</p> <p>2. Task group recommends the following communication channel loads for test purposes, with no other activity present:</p> <p>SP1,2,8 = 19.2K SP4,6 = 38.4K SP3 = 153.6K & 614K SP5S = 614K, SP8 = 19.2K, async, only ENT 1,2: 3% average hits, 1% load</p>
<i>Ballot 59</i>	5-13 (lines 26- 27)	T	The port is supposed to mimic the 2070 SP6 functionality which does not support the values of 57.6k and 115.2k.	Remove 57.6k and 115.2k from the list.	1. Task group recommends that these two rates become optional.
<i>Ballot 60</i>	5-13 (lines 35- 36)	T	The port is supposed to mimic the 2070 SP8 functionality which does not support the values of 1.2, 2.4, 4.8, 19.2, 38.4, 57.6 and 115.2 kbps.	Change baud list to only supporting 9600 baud	1. Task group points out that this was already corrected in TEES.
<i>Ballot 61</i>	5-13 (line 37)	T	The port is supposed to mimic the 2070 SP8S functionality which does not support the values of 19.2, 38.4, 57.6 and 76.8 kbps. Additionally, it is required to support 614.4 kbps.	Change baud list to only support 153.6 and 614.4 kbps.	1. Task group recommends asynchronous, only, max speed 38.4K, higher baud rates are optional

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<i>Ballot 62</i>	5-14 (lines 23- 24)	T	One of the SPI select signals should be reserved for manufacturer specific purposes.	Allocate SPI-SEL-4 as a manufacturer specific signal.	1. Task group recommends "reserved" SEL 4 becomes "mfg specific"
<i>Ballot 63</i>	5-15 (lines 16- 20)	T, G	The requirement for two Ethernet is complete overkill for over 95% of the installations. Reduce the requirement to one Ethernet, especially for a "lite" version.	Add the specification for a "lite" version to require a minimum of one Ethernet on the Engine Board, and further allow the Host Module the option of supporting no (i.e. zero) Ethernet ports.	1. Task group interprets this comment to be resolved in <i>Ballot 5</i> comment above.
<i>Ballot 64</i>	6-1 (line 11) also affects line 26	T, E, G	Not all Modulation and Demodulation options are completely specified in Chapter 6 as this line leads the User to believe (e.g. Spread Spectrum Radio).	Possible solutions: 1) Remove line 11 completely, 2) Move line 11 to line 19, or 3) Remove modulation/demodulation techniques not adequately specified (preferred)	1. Task group recommends retaining specification of modulation and demodulation within this standard, plus retaining specification of interchangeable pin out and connector type.
<i>Ballot 65</i>	6-2 (Figure 6.1)	T	Radio connector should be chosen based on field requirements, and not be dictated by this standard.	Remove "License Free Radio" from the "Specified Connectors For" list.	1. Task group recommends that choice of media will become examples of media.
<i>Ballot 66</i>	6-2 (Figure 6.1)	T	Modulation method for Spread Spectrum Radio connector should be chosen based on field requirements, and not be dictated by this standard.	Remove "Spread Spectrum" from the "Choice of Modulation" list as the standard incompletely specifies the method. (Note: One cannot specify a single method since both DSS and Hopping are extensively used within the industry. Also, the different frequency ranges are widely deployed).	1. Task group interprets this comment to be resolved in <i>Ballot 65</i> comment above.

Name/ Company	Page # & line(s)	Comment Type (T, E, G)*	Comments	Proposed Changes	Resolution of each proposed change
<i>Ballot 67</i>	6-2 (Figure 6.1)	T	Optical Amplitude Modulation for fiber communications is/has been replaced by digital techniques within the industry. For example, GDI (the creator of the 2070-6D) has moved away analog communications and moved to digital techniques. The digital versions of 2070-6D will not communicate with the analog version. Since no official standard of the 2070-6D exists, they were free to make this improvement. Also, most Users demand digital techniques to assist with troubleshooting, redundancy, etc. Analog is rapidly becoming unacceptable.	Remove "Optical Amplitude Modulation" from the "Choice of Modulation" list as the standard specifies an "obsolete" method. (Yes, Siemens makes a compliant version, but most customers want digital). Note: Once digital is chosen, there are numerous modulation techniques available and widely deployed. One will not be able to specify interchangeability easily. Suggest removing ALL specifications surrounding the 2070-6D completely.	1. Task group points out that the 2070-6D is not a part of the standard, but was included as an example of a vendor-proposed communications module compliant to the standard. This is in contrast to the TEES, where each communications module is included in the standard.
<i>Ballot 68</i>	6-2 (line 14)	T, G	The requirement for at least one communications interface slot should be removed, especially in an ATC-Lite. Users are not really receiving the functionality they are expecting, especially if multiple slots are provided.	Modify line 14 appropriately.	1. Task group recommends retaining the requirement for one communications slot. 2. Task group recommends in paragraph 6.3.1.2 change 10/100 to 10 and define Net 1-4 as Tx+ Tx- Rx+ Rx- 3. Task group recommends changing A24 from GND 1 to NA.
<i>Ballot 69</i>	6-4 (lines 4-36, 45- 46) and 6- 5 (lines 1- 2)	T, G	There are significant problems if multiple communications slots are identical. This includes who responds to a RTS signal on a port? This issue of sharing signals between multiple devices is further complicated when integrated communication ports are considered.	Change standard so that first slot has pin out as presented, but if a second slot exists then it resembles the A1 slot pin out of the ATC2070. Third, etc slots would have the same pin out as A2. Need to re-evaluate how multiple ports will share key signals.	1. Task group interprets this comment to be resolved in <i>Ballot 11</i> comment above.

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<i>Ballot 70</i>	6-5 (lines 1-2)	T, G	Existing 2070-6x and 2070-7x modules do NOT meet this requirement (for disabling their drivers after 10 bit periods). Under the impression that it was a User requirement to reuse the existing 2070-6x/7x modules.	Either 1) remove requirement to support existing 2070-6x/7x modules, or 2) remove requirement for disabling line drivers are 10 bit periods of inactivity.	1. Task group interprets this comment to be resolved in <i>Ballot 11</i> comment above.
<i>Ballot 71</i>	6-4 (lines 35-36)	T	+12VDC (isolated) and DCGND2 should not be used by any communication module per ATC2070, Caltrans TEES, and section 7.2.6.	Remove these signals from the Communications Interface (i.e. designate as NA or No Connection).	1. Task group recommends that A28 is not ABC 31 (TYPO). 2. Task group recommends +12VDC ISO and DCGND2 in comm slots become reserved, for future DCGND3 and +V for comm
<i>Ballot 72</i>	6-5	T	NEMA TS2-2002 requires a 25 pin D-subminiature connector for port 2. This standard does not support or allow such a connector (25 pin).	Add a new subsection under 6.2.3 that specifies a EIA-232 interface/connector that is compliant with NEMA TS2 section 3.3.2. This also needs to include the "latch" mechanism. This should be listed as optional.	1. Task group recommends 25 pin D be added, connected to SP1.
<i>Ballot 73</i>	6-8	T	Coaxial connector type should be driven by actual field requirements and not this standard.	Change requirement to read "...shall be via a coaxial connector."	1. Task group recommends removing "connector" and just say coaxial
<i>Ballot 74</i>	6-9 (line 30)	T	DCGND2 should not be used by any communication module per ATC2070, Caltrans TEES, and section 7.2.6.	Remove these signals from the Communications Interface (i.e. designate as NA or No Connection) and line 30 from this document..	1. Task group interprets this comment to be resolved in <i>Ballot 71</i> comment above.
<i>Ballot 75</i>	6-9 (lines 33-36)	T	DCGND2 and +12VDC ISO should not be used by any communication module per ATC2070, Caltrans TEES, and section 7.2.6.	Remove these signals from the Communications Interface (i.e. designate as NA or No Connection) and lines 33-36 completely from this document..	1. Task group interprets this comment to be resolved in <i>Ballot 71</i> comment above.
<i>Ballot 76</i>	6-10	T	2070-7A is hot-swappable ... need to add this requirement to the standard.	Add text as per 2070-7A module i.e "The Comm modules shall be "Hot" swappable without damage to circuitry or operations".	1. Task group point out this was accepted by ATC Joint Committee, and suggests a definition of "hot swappable" in terms of maximum inrush.

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<i>Ballot 77</i>	6-10	T	2070-7B is hot-swappable ... need to add this requirement to the standard.	Add text as per 2070-7B module i.e "The Comm modules shall be "Hot" swappable without damage to circuitry or operations".	1. Task group interprets this comment to be resolved in <i>Ballot 76</i> comment above.
<i>Ballot 78</i>	6-11 (line 6)	T	RS-485 Full-duplex operation also has to be supported.	Change line to read "... be simplex, full duplex, or half duplex."	1. Task group recommends the change to Full Duplex
<i>Ballot 79</i>	6-15	T, G	Need to support other modulation techniques that are currently being deployed in fiber communication infrastructures within traffic systems. Amplitude modulation is probably the least deployed technique (used on original 2070-6D but not the newer versions of the 2070-6D).	Either remove all references to modulation of fiber signals, or specify the specifics of each type of modulation (e.g. Manchester, etc).	1. Task group recommends specifying all methods via reference to a standard document.
<i>Ballot 80</i>	6-15	T, G	Need to support other modulation techniques that are currently being deployed in fiber communication infrastructures within traffic systems. Amplitude modulation is probably the least deployed technique (used on original 2070-6D but not the newer versions of the 2070-6D).	Either remove all references to modulation of fiber signals, or specify the specifics of each type of modulation (e.g. Manchester, etc).	1. Task group recommends specifying all methods via reference to a standard document.
<i>Ballot 81</i>	6-16	T, G	Need to support all modulation techniques that are currently being deployed in spread spectrum radio systems as well as different frequency ranges.	Remove all references to modulation of spread spectrum radio signals and frequency ranges.	1. Task group recommends removing all references to spread spectrum modulation, signals and frequency ranges.
<i>Ballot 82</i>	Page 6-18 line 41 to Page 6-22 line 42 inclusively	T, G	There are several variations of the 2070-6D in existence and the one specified here is outdated. Also, only an analog version is included. This specification should be removed.	Remove the referenced text completely.	1. Task group recommends removing referenced text completely.

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<i>Ballot 83</i>	7-1 (Line 13)	T, G	The requirement of preserving compatibility with existing NEMA interface software is missing ... this is the largest target audience. Need to support graphics on the display.	Add the ability to control and manipulate bit-mapped graphical displays. This is needed for such things as intersection displays, DMS message viewing/editing, etc. This device was not to only be developed to meet 2070 traffic software functionality.	1. Task group interprets this comment to be resolved in <i>Ballot 17</i> comment above.
<i>Ballot 84</i>	7-1 (line 15)	T, G	Cannot force adherence to a standard/specification that does not exist at the time of this document	Remove line 15 completely.	1. Task group interprets this comment to be resolved in <i>Ballot 4</i> comment above
<i>Ballot 85</i>	7.1.1	G	Line 34 prevents innovation. NEMA standards should not disallow a manufacturer from enhancing their products.	Remove the last sentence of section 7.1.1 (lines 33 & 34)	1. Task group recommends removal of lines.
<i>Ballot 86</i>	7-3	T, G	There is no support for graphics on the LCD. This is needed to maintain existing functionality of transportation system devices (signal controllers and DMS controllers).	Add support for graphics to the LCD section. That could include extending the LCD protocol to provide bit-map capabilities.	1. Task group interprets this comment to be resolved in <i>Ballot 17</i> comment above.
<i>Ballot 87</i>	7-15	T, G	There is no need to restrict the maximum size of a NEMA controller to the height specified. NEMA controllers sit beside a monitor that has a height restriction of 10.5"	The height of a NEMA version of the ATC should be limited to 10.5" maximum.	1. Task group points out that this was agreed by the Joint Committee, but not updated in the standard. Suggest using standard NEMA wording and size for shelf-mount controller.
<i>Ballot 88</i>	8-1 (line 16)	E	Incomplete description	Change to "NEMA/AASHTO/ITE ITS"	1. Task group recommends change to "NEMA/AASHTO/ITE ITS"

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<i>Ballot 89</i>	8-8	T	In the table "Frame Types", the values for message times for messages 52/180 and 53/181 are incorrect. Section 8.2.1.7.5 and 8.2.1.7.6 define the number of bytes to be 8 or 15, yet the difference between "Minimum Message Time" and "Maximum Message Time" is only 2.5 μ s.	Correct table entries	1. Task group points out that this standard intends to use the same frame definition as the 2070 ATC already adopted by NEMA, and therefore should use the same wording as the 2070 ATC.
<i>Ballot 90</i>	8-8	T	The message times in the table "Frame Types" appear incorrect. Numerous command/response pairs have a different number of bytes between the messages and yet the "Minimum Message Time" and "Maximum Message Time" values are nearly identical. For example, command 50 has three more bytes than response 178 which should require approximately 50 μ s and there is only 15 μ s difference allowed between the Minimum and Maximum Message times.	Suggest that the table be reorganized and that individual Minimum Message and Maximum Message times be stated for commands and responses.	1. Task group interprets this comment to be resolved in <i>Ballot 89</i> comment above
<i>Ballot 91</i>	8-13 to 8-17	G	Question the inclusion of Sections 8.2.1.9 and 8.2.1.10 in their entirety. Do not know of any application that uses them, especially traffic control. Requirements increase cost due to software complexity which then forces additional hardware.	Delete sections 8.2.1.9 and 8.2.1.10 in their entirety.	1. Task group interprets this comment to be resolved in <i>Ballot 89</i> comment above

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<i>Ballot 92</i>	8-17	T	It is unclear what the real purpose of the Watchdog is and how it works. It appears that the application program on the Engine Board is trying to set the watchdog interval of the Field I/O module ... this seems wrong.	Section 8.2.1.11 should be clarified so that it can be evaluated properly.	<p>1. Task group recommends FIO WDT will not be adjusted by the application software. Suggest timeout be set by the manufacturer.</p> <p>2. Task group points out that this standard intends to use the same FIO definition as the 2070 ATC already adopted by NEMA. Therefore, this change creates a difference between the ATC and the 2070 ATC FIO.</p>
<i>Ballot 93</i>	8-22	T	SP7 does not exist (and hence is not part of the communications interface).	Change SP7 to SP8 on line 40	1. Task group recommends changing SP7 to SP8 on line 40.
<i>Ballot 94</i>	8-26 (line 6 and Figure 8-4)	T	SP7 does not exist (and hence is not part of the communications interface).	Change SP7 to SP4 on line 6 and in Figure 8-4	1. Task group recommends changing SP7 to SP4 on line 6 and in Figure 8-4.
<i>Ballot 95</i>	10.1.4	T	Electrical Isolation requirements need to be improved to ensure that Equipment Ground is available where required (such as communication modules).	Enhance discussion of Equipment Ground requirements such that typical UL standards could be achieved (although UL certification is not a requirement, it would be nice to at least be able to follow accepted practice).	1. Task group interprets this comment to be resolved in <i>Ballot 13</i> comment above.