1791 Tullie Circle, N.E./Atlanta, GA 30329
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DRAFT

TC/TG/MTG/TRG MINUTES COVER SHEET

(Minutes of all Meetings are to be distributed to all persons listed below within 60 days following the meeting.)

TC/TG/MTG/TRG No. TC-1.4 DATE 6/26/2018

TC/TG/MTG/TRG TITLE Control Theory and Application

DATE OF MEETING June 26, 2018 LOCATION Houston, TX

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Marcelo Acosta	2017	Mark Hydeman	2017	Corresponding – 25
James Del Monaco	2017	Israa Ajam	2017	Provisional – 6
Joe Kilcoyne	2017			Guests – 5
James Coogan	2014			
Michael Pouchak	2014			
Chariti Young	2017			
Jin Wen	2017			
Ron Bernstein	2015			

DISTRIBUTION: ***All Members of TC/TG/MTG/TRG plus the following:***	
TAC Section Head: Amir Jokar, Ph.D., P.E., CFEI	SH1@ashrae.net
All Committee Liaisons As Shown On TC/TG/MTG/ TRG Rosters (Research, Standards, ALI, etc.)	bholocom@easinc.net; jatkisson@aeieng.com; kato@iis,u-tokyo.ac.jp; kelly.cramm@hendersonengineers.com; rheiden@trane.com;
Mike Vaughn, Manager Of Research & Technical Services	MORTS@ashrae.net

Note: These draft minutes have not been approved and not the official, approved record until approved by the TC.

ASHRAE Technical Committee 1.4

Meeting Agenda

TC 1.4 Control Theory and Application
http://tc14.ashraetcs.org/
Tuesday, June 26, 2018 1:00 – 3:30 pm 371CF George R. Brown Convention Center., Houston TX

"Commitment to the ASHRAE Code of Ethics – In this and all other ASHRAE meetings, we will act with honesty, fairness, courtesy, competence, integrity and respect for others, and we shall avoid all real or perceived conflicts of interests. (See full Code of Ethics: https://www.ashrae.org/about-ashrae/ashrae-code-of-ethics.)"

TC 1.4 Control Theory and Application	Tuesday 1:00 PM	371CF	(3)
TC 1.4 YEA/Education	Sunday 2:00 PM	344AB	(3)
TC 1.4 Control Components and Applications	Sunday 3:00 PM	344AB	(3)
TC 1.4 Programs	Sunday 4:00 PM	344AB	(3)
TC 1.4 Research	Monday 2:30 PM	340A	(3)
TC 1.4 Handbook	Monday 4:30 PM	340A	(3)
TC 1.4 Executive	Tuesday 8:30 AM	330	(3)
TC 1.4 RP-1711 SOO's for Hydronic Systems	Tuesday 9:30 AM	340A	(3)

Seminar 1	Division 25 Challenges! When Integrated Automation Isn't	Sunday 8:00am
Seminar 7	Field vs. Factory Programmed Controls	Sunday 9:45am
Seminar 11	Applying Analytics to Existing HVAC Systems: Benefits, Challenges and Lessons Learned	Sunday 11:00am
Seminar 29	Control Freaks and Internet of Things Geeks: The Future of Building Automation	Monday 9:45am
Seminar 43	What is BACnet Tagging About?	Tuesday 8:00pm
Seminar 44	Advanced Sequences are Optimal: Getting There, Not So Much!	Tuesday 9:45pm
Seminar 65	Air Flow Control from Text Book to Test Standard	Wednesday 9:45pm

1) **Call to Order**

2) **Introduce Members, Guests, and Liaisons**

3) Roll Call (Quorum)

X	Marcelo Acosta, 6/30/19		Mark Hydeman, 6/30/21
X	James Del Monaco, 6/30/21	X	Chariti Young, 6/30/21
X	Joe Kilcoyne, 6/30/19	X	Ron Bernstein, 6/30/19
X	Jim Coogan, 6/30/18		Israa Ajam, 6/30/21
X	Michael Pouchak, 6/30/18	X	Jin Wen, 6/30/21

4) TC 1.4 Scope

a) ASHRAE Technical Committee 1.4 is concerned with control theory, systems, and components (excluding refrigerant flow controls) for heating, ventilating, air conditioning, and refrigeration uses.

5) Approve minutes from previous meeting (posted on website)

a) Joseph Kilcoyne motions to approve. Chariti Yung seconds. Approved 8-0-0

6) Approve agenda

a) Ron Bernstein motions to approve. Kim Barker seconds. Approved 8-0-0

7) Announcements

a) **CEC**
   i) CEC is open to new session format proposals
   ii) Work with a track chair to put together a series of sessions that can be used as a mini-track
   iii) Putting together an entire track of programs in cooperation with other TCs is also encouraged; keeping in mind that track subjects are typically determined 14-15 months prior to a conference.
   iv) Looking for Reviewers and Paper Session Chairs

b) **TAC**
   i) 2018-2019 George B. Hightower Award Nominations due to Section Head September 1.
   ii) 2018 & 2018-2019 Service to ASHRAE Research Award Nominations due to Research Liaison Sep. 1, 2018
   iii) TC members improperly using ASHRAE letterhead – Urgent Request!
   iv) MTGs that have been formed since Chicago Meeting – MTG.EBO (Effective Bldg. Operations) It's requesting participation from TC-1.4
   v) Let's Celebrate ASHRAE's Technical Excellence Historically!
   It'll be celebrated by papers and sessions emphasizing technical advances brought by ASHRAE after 1920. The 125th anniversary will be celebrated at the 2019 Annual meeting and the 2020 winter and Annual meetings. The Historical Committee has been charged with the responsibility of organizing Society and industry history projects for the 125th. If you would like to submit a journal article or a paper, or organize a program session, or suggest the best technical paper(s) since 1995, contact Chris Preyor, cpreyor@ashrae.org. Deadline is December 7, 2018 for consideration for the Orlando 2020 or Austin 2020 meetings.
   vi) Updated TAC Presentation Template Available for TC members to use with local Chapter www.ashrae.org/tcs under the heading General TC Information

vii) Basecamp Information from ECC.
The link to TC-1.4 Basecamp is https://3.basecamp.com/3106353/projects/8184907 If you can't access it, please request an invitation to TC-1.4 at TC0104@ashrae.net
viii) Thank You Letters to Employers – An email with a form will be sent out in early July.
ix) 2019 RPM (Remote Participation Meetings)
(1) For Atlanta, Remote Participation Meetings were requested for YEA, Components, Programs, Research, Handbook, and the General meeting
x) For all terminology doubts in publication, sessions, etc. use the definitions in the official ASHRAE glossary https://xp20.ashrae.org/terminology/
xi) TAC Survey on TC Strengths – Weaknesses – Opportunities and Threats (SWOT) Participate in the before Wednesday, 6/27/18 using the following survey link: https://www.surveymonkey.com/r/S9LRZKB

c) **RAC**
i) Increased frequency for RTARs and WSs. Added Aug 15 deadline.
ii) PMS training coming up in October
iii) Priority will be giving to RPs for the Residential Sector
iv) August 15th is the next upcoming deadline to submit RTAR's to TAC

d) **YEA**
e) **TC1.4 Member Awards**
i) The TC-1.4 Awards Chair, Dave Kahn is back. If members believe that they have enough points to qualify for an award, Dave asks that the member send him their bio and he will submit on their behalf. Also, members need to update their official bio in the system prior to this. Update your ASHRAE Bio!!!

8) OLD BUSINESS

a) PROJECT COMMITTEE AND ONGOING RESEARCH REPORTS

i) SSPC 135 (BACnet)
(1) No one from SSPC 135 in attendance. 1.4 to request attendance from a 135 representative to provide an update on their activities as 1.4 is their cognizant technical committee. Chariti volunteered to find who needs to be contacted.

ii) SGPC 13 (Specifying Building Automation Systems) – Ron Bernstein
(1) Working on new sections on FD&D and cybersecurity, as well as enhancements to multi-tier architecture and nomenclature.

iii) GPC 36 (High Performance Sequences of Operation for HVAC Systems) – Mark Hydeman
(1) GPC 36P available in the ASHRAE bookstore and online.
(2) The GPC will be working on addenda as comments come in.

b) SUB-COMMITTEE REPORTS
i) **Executive** – Marcelo Acosta
(1) Roster updated
(2) Voting items
(a) New voting members: Larry Fisher, Brandon Gill
(b) Rolling out: James Coogan and Michael Pouchak
(3) In May, TC-1.4 approved 9-0-0 to send to TAC and other technical groups in ASHRAE for discussion, a proposal for a new publication or extension of Guideline 36 scope.

Details in the Control Components and Applications Subcommittee minutes, a few pages below.

ii) **Control Components and Applications** – Chad Moore
(1) Discussions center around a proposal that TC 1.4 submitted for a new special publication for Subsystem Macroblocks as an extension to Guideline 36.
(2) Another discussion focused on integrating smart equipment into the BAS

iii) **Program** – Frank Shadpour
(1) 7 sessions at this conference
(2) 13 proposals for Atlanta plus one TC introductory session

iv) **Education/YEA** – Michelle Shadpour
(1) Successful introduction of TC activities to guests
(2) Creation of an Instagram account for the TC, targeting young audiences.
(3) The Instagram account will include some short video clips which answer common questions about controls. Details about its location and how to submit questions will be sent shortly.

v) **Handbook** – James Del Monaco
(1) Chapter 47 – Sent for publication; currently in the editing process.
(2) Focus is now on Chapter 7 of the Fundamentals Handbook. Edits now occur online in ASHRAE's Editing Portal. All members of the TC can access this system. All TC members are requested to review Chapter 7 and comment.
(3) Authoring Portal: https://authoring.ashrae.org/pages/default.aspx (Internet Explorer or MS Edge ONLY). Select "ASHRAE Handbook", then "2021 Fundamentals", then "07_2021_Fundamentals of Controls", then "Content", then "I-P_and SI_F17_Ch07". May require login in twice.

vi) **Research** – Kim Barker
(1) 1711-RP (Advanced Sequences of Operation for HVAC Systems – Phase II Central Plants and Hydronic Systems) – Marcelo Acosta
(a) Task 1 complete; A draft of Task 2 sequences of operation is out to the PMS for review; Next steps are review and vote to approve Task 2, then start Task 3 – programming.
(b) Mike Pouchak requested a summary sheet of RP progress by the PMS. This is in line with a new directive by RAC for PMS responsibilities. RAC has published a 20-minute video summarizing PMS responsibilities.
(i) More details about project status in the 1711-RP progress meeting minutes below.
(2) 2 new RTARs
(a) DOAs Supply Temperature Optimization. An RTAR will be submitted soon. Comments on Dove's RTAR are requested back by July 15.
(b) Boiler Internal controls effect on efficiency – for Std. 103. This needs more discussion and development prior to submittal to the TC.
(3) WS – Effective BAS User Interfaces under development
(a) Consensus was not reached on the approach to this proposed RP. It may be split into two separate projects
(4) WS – Last summer RP 1746 was terminated; Kim contacted by Mike Vaughn about what is needed to get this one going again. He suggested revamping the work statement to focus on Guideline 36. Joe Zhao and Mark Hydeman have volunteered to

rewrite the work statement with the goal for TC review and submittal before the upcoming August deadline.

vii) **Standards** – Steve Taylor
(1) No update

viii) **Webmaster** – Josepth Kilcoyne
(1) No update

c) COMMITTEE LIASION REPORTS
i) TC 1.5 (Computer Applications) – Mike Pouchak.
(1) Cybersecurity will be a focus of the upcoming ASHRAE president;
(2) There is a push to change the TC name from "Computer Applications" to "Emerging Applications".

ii) TC 1.6 (Terminology)
(1) Seeking Liaisons to update the TC on activities.
(2) The need for using the official ASHRAE terminology https://xp20.ashrae.org/terminology/ was noted.

iii) TG 2 HVAC Security – Kim Barker
iv) TC 5.6 (Control of Fire & Smoke)
v) TC 6.1 (Hydronic Systems)
vi) TC 6.7 (Solar Energy Utilization) – Gaylen Atkinson
vii) TC 7.3 (Operations & Maintenance Management)
viii) TC 7.5 (Smart Building Systems) –Jin Wen
ix) TC 7.6 (Systems Energy Utilization)
x) TC 7.9 (Building Commissioning) – David Bornside
xi) TC 9.10 (Laboratory Systems) – Jim Coogan
xii) TC 9.11 (Clean Rooms) – Phil Naughton
xiii) SSPC 62.1 (Ventilation and Acceptable IAQ) − Len Damiano
xiv) SSPC 90.1 (Energy Efficient Design of New Buildings) – Steve Taylor
xv) SSPC 202 (Commissioning Process for Buildings and Systems) – Barry Bridges
xvi) TC 1.6 (Terminology) – David Bornside
xvii) SGPC 0.2 & 1.2 (The Commissioning Process) – David Bornside
xviii) SPC134 (Graphic symbols for HVAC systems) – David Bornside
xix) SPC 189.1 Design of High Performance Building – Bogi Setty
xx) MTG Occupant Behavior in Buildings – Kim Barker

d) SOCIETY COMMITTEES

9) TC1.4 Roster Update
a) 2 Voting members replaced on July 2018 (details in the Executive section above)
b) 6 Provisional Corresponding Members moved to Corresponding Members
c) 4 Provisional Corresponding Members and 8 Corresponding Members removed from roster due to lack of participation for 4 years.

10) Upcoming Deadlines

a) For Winter Meeting in Atlanta, Georgia January 12 – 16, 2018
i) Conference Papers are due July 9
ii) Seminar, Forum, Debate, Panel and Workshop proposals are due August 3

iii) **Atlanta Conference Tracks**

- Track 1: Systems and Equipment
- Track 2: HVAC& R Fundamentals and Applications
- Track 3: Refrigeration
- Track 4: Construction, Operation and Maintenance of High Performance Systems
- Track 5: Common System Issues and Misapplications
- Track 6: The Convergence of Comfort, Indoor Air Quality and Energy Efficiency
- Track 7: Building Integrated Renewables and Natural Systems
- Track 8: The Engineer's Role in Architecture

11) New business

a) Macroblocks proposal being discussed by TAC, GPC-36, and 20 TCs
   i) 5 TCs declared it's not applicable to them (e.g. Refrigerants Chemistry)
   ii) 3 TCs declared they are already using them (Transport Refrigeration, Data Centers, and Potable Water Systems)

b) Larry Fisher has been requested by ASHRAE to create or update an existing 3 to 6 hours training course for building automation controllers' installation best practices, ideally to be delivered next year. He is looking for volunteers to help him with the update/development.

This intermediate course covers best practices for installing DDC control systems. This course will benefit consulting engineers, DDC Design Integration Engineers, Commissioning Authorities, and lastly but most importantly, the DDC Controls Installing Contractor. Unlike bricks and mortar, the facilities DDC controls is a living breathing system that an owner will use for the life of the building. Many control systems don't work as designed on day 1 much less in 2-3 years. Many aspects of installing controls is up to the discretion of the installing contractor. The possibilities of greater issues arise if using sub-contractors that do not routinely install control systems. If quality installations, especially in the global climate, is addressed and better standardized it will enhance the success of the controls system. This course will bring more uniformity to ASHRAE consultants, contractors, code officials, etc. and position ASHRAE as a more authoritative source. Upon completion attendee will better understand how to properly install a control system and what to look for and commission these systems properly for the benefit of the owner and the life of the building.

12) Next Meeting – Atlanta, GA | January 12-16, 2019

13) Adjourn

TC 1.4 Control Theory and Application

YEA/Education Subcommittee Meeting Agenda **Houston – June 24, 2018**

2:00-3:00pm **Hilton**

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1) Introductions

2) Young Engineers in ASHRAE (YEA) attendance

3) Discussion Topics

   a) What is a TC?

   b) What does TC 1.4 do?

      i) Subcommittees – education, programs, research, handbook, etc.

   c) How to increase involvement of YEA members

      i) Social Media:

      Instagram (Existing Topic)

      Purpose: Increase presence on social media.

      Status: Unofficial account made and pitched the idea to the team.

      New Ideas: Reach out to YEA Facebook for questions regarding controls that are to be posted with video response answers.

Meeting adjourned at 3:02pm

TC 1.4 Control Theory and Applications

Research Subcommittee (RSC) Activities **Houston – June 25 2018**

RSC Meeting Minutes:

1. Announcements

a) Tech Council
- RAC to look into more "Applied" Research
- Evaluate the concept of allocating Research funds for post project processing that will produce tools, presentations, etc. that add value to the membership and society (not just ASHRAE, but aligns with our mission)
  (1) Could be a second bid package for the post "data" research project to perform "applied research to make the tool.
  (2) Could be a line item budget for hiring outside services to "finish" the holistic research project not just Work Plan scope.

b) Updates
- Updated Research Manual will be posted after St. Louis. New milestones for PMS and other changes.
- Training material is being reviewed for placement on ASHRAE website
- RAC will place emphasis on PMS training (Chairs & committee) with new milestones.
- Research database is online with about 250 projects with more to follow.

c) Stats
- RTARs: 3 Accepted, 0 Rejected
- WSs: 1 Conditionally accepted, 3 Returned

d) Honors & Awards – need to submit nominees
- Service to ASHRAE Research – Sept 1st
- Homer Addams Award – Graduate Student with published paper – Dec 15.
- New Investigators Award – Dec 1st. One was just awarded from 16 nominations.
- Grant-in Aid – Mar 1st

e) Web-based Training Modules for RTAR, WS, PES and PMS.

f) WS and TRP's must have milestone chart and associated costs for each milestone as a percent of total project cost. Bidders may propose a different milestone chart with associated costs than suggested in the RFP. A questionnaire will be sent to PMS Chair at each milestone level to obtain project status. Payments at each milestone level will be made to the contractor only after approval of each milestone deliverables by the PMS.

g) Reminder:
- RTARs and WSs should be reviewed by liaison prior to submission to RAC. TC 1.4 Research Liaison is Shinsuke Kato RL1@ashrae.net and Art Giesler RACvchair@ashrae.net

2. Active Project Status:

Name	Project	PMS	Status
RP-1455			**TC NEEDS TO PROVIDE COMPLETED DISPOSITION OF ASHRAE RESEARCH RESULTS FORM TO MORTS TO CLOSE-OUT PROJECT**
RP-1587			**TC NEEDS TO PROVIDE COMPLETED DISPOSITION OF ASHRAE RESEARCH RESULTS FORM TO MORTS TO CLOSE-OUT PROJECT**
RP 1746	Field Validation of GPC36 Sequences	Joe Zhou Mark Hyeman	**TC SHOULD WORK TO REBID PROJECT UNDER NEW PROJECT NUMBER ASSIGNED BY MORTS**. Discusson: Survey of projects implementing GPC36. DCV multi-space work from RP-1747.
RP-1711	Advanced Sequences of Operation for HVAC Systems – Phase II Central Plants and Hydronic Systems	Barry Bridges Marcelo Acosta Mark Hegberg Justin Atkinson	PMS meeting on Tuesday. Draft sequence assembled and sent to PMS for review. Task 1 completed, moving on to Task 2. **PROJECT ON SCHEDULE AND PROGRESS REPORTS UP-TO-DATE**
RP-1661 **TC 4.7 w/1.4 Co-Sponsor**	Development of Modelica Models for Evaluation of Supervisory Control Strategies	Michael Wetter Wangda Zuo Jeff Stein	Done with Task1. Working on Task2 development of models. On-schedule. Next is Task3 evaluation of models

3. Pending Research Project Status:

Status	Project	Champion	Remarks

4. Possible Research Project Status:

Status	Other TCs	Project	Champion	Remarks
RTAR-1832	Co-sponsor TC7.5	Applied Performance of Control Loops (RP-1587 Part 2)	Zheng ONeill Kim Barker Hwakong Cheng	RAC REJECTED RTAR AFTER 2017 ANNUAL MEETING Will resubmit RTAR in Atlanta
RTAR draft	Co-sponsor(s) TC4.7 TC7.5	Optimizing Supply Air Temperature Control for Dedicated Outside Air Systems	Jingjuan (Dove) Feng Steve Taylor Brandon Gill	Send RTAR draft to TC1.4 committee for review/comment.

Status	Other TCs	Project	Champion	Remarks
RTAR	Co-sponsor TC	Common GUI system graphics for BAS Operators	**Marcelo Acosta** Kim Barker Barry Bridges John Wallace	Discussion topics: Identify minimal data set required for functional objects. Same data, different look to GUI. How many clicks do you need to achieve function? Start with survey study (core functions). RP-1633. What should be on the GUI (e.g., GP36). GPC-13 what needs to be delivered, examples show different options..
IDEA		%kW vs, %CFM and %GPM curves for real systems	Steve Taylor Joe Zhou Jim Coogan Jin Wen	Real variable flow systems do not have ideal parabolic system curves because of closing dampers/valves. DP setpoint reset helps but actual and simulated performance doesn't match.
WS	Co-sponsor TC 6.1	Selecting Control Valves	Steve Taylor Carol Lomonaco	Work statement under development.
IDEA		Specifying BAS graphics (Data sets, functional objects)	Ron Bernstein	
IDEA		Field verification of GPC36 Single Zone VAV RTU	**Kim Barker**	Need to read and investigate the merit of this IDEA. What are benefits of applying GPC36 to SzVav RTUs with DxVarSpd compressors (varspd, fixed & varspd).
IDEA	Co-sponsor TC7.5	Effectiveness of Night Setback and Optimum Start	**Gregory Cmar** Kim Barker	Cold climates impact SSTO. How can we automate when you need to adjust night setback variable. Develop control sequence based on recovery time. Simulation for guidelines for changing reset temperature. Determine seasonal space temperature setpoint reset and/or impact of using rolling weather forecast (next-day, 3-day, 7-day) via internet.
IDEA NEW	7.5	Alarm Management, Alarm escalation, suppression, alarm flooding, latching etc..	**Carol Lomonaco** Kim Barker Jin Wen (TC7.5)	Prioritize alarms and what do you do with it! *BAS Alarm Management for Operation and Maintenance Decision Making (CH-18-C001)* Validation of GPC36 alarms.
IDEA		Optimized Supply Air Temperature Reset Strategies	Steve Taylor Joe Zhou Jim Coogan Mike Pouchak	CEC project completed, do we want to do this for other climate zones.

Status	Other TCs	Project	Champion	Remarks
IDEA		Controlling HVAC using effective temperature (ET)	Joe Zhou	Does using ET instead of drybulb temperature reduce energy efficiency? Simulation followed by field test. Joe looking for grad student to develop this.
IDEA		Coordinating control of hybrid radiant and air systems for maximum efficiency	Phil Haves	Applies primarily to hybrid systems but also could apply to DOAS with respect to supply air temperature control.
IDEA		Develop conventional sequences from MPC optimized sequences	Phil Haves	Near-optimum sequences developed from model predictive controls that are too cumbersome to work in real-time control systems.
IDEA	TC7.6	Cost & benefits of commissioned building controls	David Underwood Joe Zhou Ron	When does building performance start to degrade? Persistence of controls – TC7.6 Control persistence by ComEd (28 bldgs). Interest for more wide research. Discuss in Atlanta.
NEW IDEA	Co-sponsor TC1.5	Survey Near field communications(NFC) use for BAS	Carol Lomonaco	What is the applicability of this communication Hackers, Security impact, Seen in commissioning valve actuators, small devices (use your phone).. www.nearfieldcommunication.org

5. Research RTARs and WS Deadlines:

- March 15 for spring meeting
- May 15 for June meeting
- August 15 for fall meeting
- December 15 for January meeting

6. Adjourn: 4:30 pm

7. In Attendance: See attached sheet.

MINUTES

TC 1.4 Handbook Subcommittee

June 24, 2018 / 4:30 – 6:30

Hilton Americas – 340.A

1. **CALL TO ORDER**
2. **REPORT FROM APPLICATIONS HANDBOOK LIAISON (Bryan Holcomb)**
   - 2.1. Chapter 47, "Design and Application of Controls" was submitted. Expect proofs between November 2018-January 2019.
   - 2.2. Applications Handbook is being issued in 2019.
3. **REPORT FROM FUNDAMENTALS HANDBOOK LIAISON (Jason Atkisson)**
   - 3.1. TC approval for 2021 Fundamentals, Chapter 7 "Fundamentals of Control" is due on July 5, 2020.
4. **NEW BUSINESS**
   - 4.1. Chapter 47 of the Applications Handbook has been submitted to ASHRAE editors. Thanks to everyone who reviewed the Chapter for final approval and comment. Special thanks to Marcelo, Jacky Ly, Chad Moore, and Barry Bridges.
   - 4.2. Begin working on Fundamentals, Chapter 7.
   - 4.3. Edits to the Chapter will be done using the ASHRAE Authoring Portal (AAP). The link to the portal is as follows: www.portal.ashrae.org. Internet Explorer is the only compatible browser. Anyone who's associated with TC1.4 can access the Chapters associated with this TC. Further guidance on the AAP can be found at the following link: https://www.ashrae.org/technical-resources/ashrae-handbook/ashrae-handbook-central
   - 4.4. Recommend members review Chapter 7 prior to the January meeting in Atlanta. Focus on identifying outdated, wrong, or missing information. We want to capture any state-of-the art equipment, devices, features, etc.
   - 4.5. Recommend reaching out to our YEA members to help us in reviewing and seeing what other information they would like to see in the Chapter.
   - 4.6. Coordinate with TC6.1 to review who covers Control Valves.
5. **NEXT MEETING AND SCHEDULE**
   - 5.1. 4:30-6:30 Monday January 14, 2019 Annual meeting in Atlanta, GA.
6. **Adjourn**

   Adjourned at 6:30

TC 1.4 Handbook Subcommittee Attendance List

Present	Name	
X	James Del Monaco	

X	Barry Bridges	
X	Chariti Young	
X	Dave Kahn	
X	Chad Moore	
X	Marcelo Acosta	
X	Charlotte Dean	
Liaisons		
	Bryan Holcomb	Applications Handbook Liaison
	Bob Walker	Liaison from TC 6.1 Valves
	Jason Atkisson	Fundamentals Handbook Liaison

Chad E. Moore, P.E., LEED
Chair, Control Components & Applications Subcommittee
350 Edgewood Terrace Drive
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Reply to: **Engineering Resource Group**

TC1.4 Control Components & Applications Subcommittee Meeting
Meeting Date: June 24, 2018, 3:00 -4:00 pm
Hilton, 3rd Floor, 344 AB.
Subcommittee Focus: Brainstorming Session, "open forum" discussing what is new in Building Automation System control components and applications.
Minutes:

1. Introductions
- Attendees: 18
- YEA members: 4

2. TC1.4 Announcements

Attend our Sponsored Programs:

Seminar 1 (Intermediate)
Division 25 Challenges! When Integrated Automation Isn't!
Sun. (06/24/18), 8:00 am–9:00 am
Track: HVAC&R Control Freaks | Room: 370ABDE

Seminar 11 (Intermediate)
Applying Analytics to Existing HVAC Systems: Benefits, Challenges and Lessons Learned
Sun. (06/24/18), 11:00 am–12:30 pm
Track: HVAC&R Analytics | Room: 371DE

Seminar 43 (Intermediate)
What is BACnet Tagging About?
Tues. (06/26/18), 8:00 am–9:30 am
Track: HVAC&R Control Freaks | Room: 372BE

Seminar 65 (Intermediate)
Air Flow Control from Text Book to Test Standard
Wed. (06/27/18), 9:45 am–10:45 am
Track: HVAC&R Control Freaks | Room: 372CF

Seminar 7 (Intermediate)
Field vs. Factor Programmed Controls
Sun. (06/24/18), 9:45 am–10:45 am
Track: HVAC&R Control Freaks | Room: 370CF

Seminar 29 (Intermediate)
Control Freaks and Internet of Things Geeks: The Future of Building Automation
Mon. (06/25/18), 9:45 am–10:45 am
Track: HVAC&R Control Freaks | Room: 371AB

Seminar 44 (Intermediate)
Advanced Sequences are Optimal: Getting There, Not So Much!
Tues. (06/26/18), 9:45 am–10:45 am
Track: HVAC&R Control Freaks | Room: 370ABDE

Attendance at the Technical Programs requires conference registration.

Discussion Topics

• TC1.4's proposal for new Special Publication (TC1.4's Proposal is included in Attachment 1) • TC-1.4 proposes the creation of an extension of Guideline 36 (or if not possible, a new Guideline), to provide detailed descriptions of the subsystems for which Guideline 36 provides sequences of operations.

• Discussed the new special publication, what the purpose of the document will be.

• Discussed possible items to be included in publication and how would this publication be received by the HVAC industry.

• How can industry pay for sequences developed as part of this publication? If the industry (engineers, owners, end-users, etc.) demands them, manufacturer's will build them.

• Model Predictive Control (MPC). Publication could potentially utilize MPC.

• Manufacturer's to build to minimum standards, manufacturer's can improve upon minimum requirements.

• To implement this publication, the current BAS paradigm would need to change.

• Publication must define hardwired and virtual points so manufacturer's can design and build BAS system to implement sequences.

• Life expectancy of controls: 10-15 years.

• Distributed versus centralized controls. High-speed ethernet/IP based controls may make centralized control more viable.

• IT versus OT expectations. OT often requires faster responses.

• Guideline 13 adopted 4-tier communication model.

• Waiting on TAC to get feedback from Guideline 36 to determine which direction the special publication will go.

• Integrating smart equipment into BAS. • Implement a Standard to interface with smart equipment and not having to recreate graphics, points, etc.
• Take advantage of the equipment manufacturer's software and graphics.
• Do we want to initiate a research project to develop standard BAS graphics.
• What should the graphical user interface to look like. Feedback with building users: simple is better.
• Graphics should reflect workflow.
• Graphics depend on users preference.
• Industry needs help determining what is displayed on GUI.

4. Adjourned meeting at 4:05 p.m.

ATTACHMENT 1
PROPOSAL FOR NEW SPECIAL PUBLICATION

Summary

TC-1.4 proposes the creation of an extension of Guideline 36 (or if not possible, a new Guideline), to provide detailed descriptions of the subsystems for which Guideline 36 provides sequences of operations.
TC-1.4 believes this would help
· increase the probability of systems being built, being operated, and perform as designed
· increase the HVAC systems reliability
· reduce design complexity, allowing to produce thorough designs in the same billable hours
· reduce the design cost and risk of complex strategies, such as automatic fault detection and diagnostics for systems, therefore allowing for their widespread use

· accelerate and simplify the adoption of new technologies, by integrating them into these subsystems.

BACKGROUND

TC-1.4 has organized surveys and brainstorming sessions during subcommittee meetings and program sessions to tackle the **poor energy performance and reliability of HVAC systems**, as well as the **slow adoption of new technologies** that would help solve them. In those sessions, members expressed their **concern for the energy waste and environmental impact of the HVAC systems**.

They also expressed their misgivings about most new technologies, as they tend to be complex and misunderstood, so when included in designs, they tend to not be implemented and operated as they should. This was confirmed by building surveys by PNNL and Berkeley Lab: a few years after commissioning, most buildings with new designs don't perform as expected, but similarly to buildings designed 30 years ago.

Also, the fact that current designs use equipment as basic building blocks, and the short design time available, limits the complexity and thoroughness possible in HVAC designs. All this causes the widespread practice of replicating old and less efficient, but simpler and time-tested designs.

More efficient designs being usually more complex, and needing more fine tuning, require more details, and better understanding by all parties involved throughout the system life.

In short, the emerging consensus is that efficient designs and technologies would be gladly adopted if they were

· reliable and pretested
· as plug-and-play as possible
· easy to incorporate in designs
· easily understood by all parties
· auto-detecting performance and operation deviations, and if possible, self-correcting.

Guideline 36, a compilation of High Performance Sequences of Operation for HVAC Systems, is a first step towards a solution.

As Guideline 36 came out for public review in 2017, and before formal publication, some ASHRAE members started using it and soon questions came to GPC-36 and TC-1.4 requesting descriptions and specifications of the systems they applied to.

Specifically, we received enquiries about sensor locations, type, and accuracy; minimum equipment technology and how variations (e.g. the presence of a desiccant wheel) would change the controls; how these subsystems would interact with other subsystems (e.g. chiller plant, boiler plant, and air handlers); and what subsystems would be compatible with others while maintaining the proposed reliability and efficiency.

PROPOSAL DETAILS

A solution to the problems and limitations listed above is having a set of well defined, tested, and efficient subsystems, or "macroblocks", to be used as the basic building blocks of HVAC designs.

ASHRAE can provide a **compilation of macroblock designs** in a guideline, which would be referenced in HVAC designs. E.g. "The chiller plant shall be ASHRAE Guideline XX, subsystem 26, with options A, D, and E, sized for 850 Tons"

Each subsystem specification should at least include:

- Minimum requirement specifications for all the equipment, including accessories (e.g. valves, water treatment, strainers)
- Equipment connection diagram (P&ID), with all accessories, sensors location, and ducts and piping sizing guidelines (or pointers to those guidelines).

- Controls equipment minimum specifications, detailed sequences of operations (or pointers to sections of Guideline 36)
- Options (e.g. optional geothermal field in parallel with cooling towers)
- All interfaces required for interactions with other subsystems, from piping connection ports, to network points, and related functions (e.g. how the boiler plant will use the load valves position to optimize the supply temperature and distribution pumps speed), to make them as plug-and-play as possible.
- All sensors and routines required for automatic fault detection, diagnostics, and ongoing commissioning.

They may also include:
- EnergyPlus model which can take the models of the specific equipment used.
- Commissioning and maintenance recommendations.
- Sensors and logic to verify the equipment performance. This should be accompanied with a requirement for equipment suppliers to provide an efficiency map at the time of submittal, which will be part of what's covered by their warranty, as well as the "as-built" efficiency map measured before shipping.

Before inclusion in the guideline, samples of these subsystems should be built, tested, and improved via ASHRAE research projects, potentially with co-sponsors, satisfying the "pretested" need.

The incorporation of new technologies into these thoroughly designed, pretested, and almost plug-and-play macroblocks would make their adoption significantly easier and faster.

As the development of these specifications should involve expertise from most ASHRAE technical groups, we request this proposal is forwarded to all ASHRAE groups chairs for discussion. We'll be looking forward to their feedback.

TC 1.4 – PROGRAM SUBCOMMITTEE

ASHRAE WINTER MEETING
HOUSTON - JUNE, 2018

The subject meeting was held on Sunday, June 24, 2018 starting at 4:00 PM following the Components and Control Applications Subcommittee meeting. The attendees remained. The sign-in sheet is attached. Special thanks to the active members of TC 1.4.

Programs Presented in Houston: June 23 – June 27, 2018

1. Seminar 1: Division 25 Challenges! When Integrated Automation Isn't!
Chair: Ron Bernstein, Sunday, 8:00 a.m. - 9:00 a.m. Room: 370ABDE

2. Seminar 7: Field vs. Factory Programmed Controls
Chair: Chariti Young, Sunday, 9:45 a.m. - 10:45 a.m. Room: 370CF

3. Seminar 11: Applying Analytics to Existing HVAC Systems: Benefits, Challenges and Lessons Learned
Chair: Chariti Young, Sunday, 11:00 a.m. - 12:30 p.m. Room: 371DE

4. Seminar 29: Control Freaks and Internet of Things Geeks: The Future of Building Automation
Chair: Joseph Kilcoyne, Monday, 9:45 a.m. - 10:45 a.m. Room: 371AB

5. ***Seminar 43: What is BACnet Tagging About?***
Chair: Carol Lomonaco, Tuesday, 8:00 a.m. - 9:30 a.m. Room: 372BE

6. Seminar 44: Advanced Sequences are Optimal: Getting There, Not So Much!
Chair: James Del Monaco, Tuesday, 9:45 a.m. - 10:45 a.m. Room: 370ABDE

7. Seminar 65: Air Flow Control from Text Book to Test Standard
Chair: James Coogan, Wednesday, 9:45 a.m. - 10:45 a.m. Room: 372CF

Anticipated Programs for 2018 Houston That Did Not Take Place:

1. Workshop: How do we control the pressurization is Hospitals?
Chair: Chad Moore (Cosponsor 9.6)

2. Debate: Control Component Nano-Blocks vs. Macro- Blocks. Is Bigger Better?
Chair: Marcelo Acosta

3. Panel Discussion: Control Freakonomics – Wanabees & Winners!
Chair: Michelle Shadpour

4. Seminar: Control of District Energy and Cogen Systems
Chair: Chad Moore

5. Seminar: How to Assess the DDC systems of an Existing Facility?
Chair: Frank Shadpour

Programs Proposed for 2019 Atlanta Winter Conference Jan 12 - Jan 16, 2019

1. TC1.4 Special Seminar: Want to CONTROL the World?
Chair: Elise Backstrom, Michelle Shadpour (mentor: Marcelo)

2. Workshop: How do we control the pressurization is Hospitals?
Chair: Chad Moore (Cosponsor 9.6)

3. Debate: Control Component Nano-Blocks vs. Macro- Blocks. Is Bigger Better?
Chair: Marcelo Acosta

4. **Seminar: Control of District Energy and Cogen Systems**
Chair: Chad Moore (TC 6.2)

5. **Seminar: Integration of Renewable Systems – Control Challenges!**
Chair: Michelle Shadpour (TC 6.7, TC6.8)

6. Seminar: Controlling the Braves New World!
Chair: Chariti Young

7. Workshop: Making the Fundamentals Easy! Using Guideline 36.
Chair: Mark Hydeman (GPC 36)

8. Seminar: Diagnosing Misapplications of Controls in an Existing Facility.
Chair: Frank Shadpour (9.11, Gary Shamshoian) (TC 7.5)

9. Seminar: Persistence of Building Control Improvements!
Chair: Scott Hackel (7.6)

10. Seminar: Architecting Building Automation Systems – The convergence of IT, OT & IoT.
Chair: Ron Bernstein (SPC 135, Guideline 13)

11. Seminar: IAQ & Comfort through Building Automation Systems
Chair: Jim Coogan

Program "Pipeline" for Future Meetings:

1. Seminar: How to Become a Building Automation Engineer?
Chair: Dave Kahn (YEA)

2. "Be Alarmed at what your BAS is not Telling You: Is no news really good news?"

3. Web-Services. XML, SOAP: How Do I Get Non-Traditional BAS Information and Use It for My Building Automation.

4. Controls for Fuel cells, Cogeneration and Micro-cogeneration, Renewables

5. Data Analytics… What interesting information can be derived from BAS data?

6. Special Sensors: Contaminants and Microbial Sensors

7. Project Control Submittals – What should it include?

8. Designing Command and Control Center for Buildings and large campuses

9. Humidifiers and Humidity Control for Critical Spaces.

10. How to Assess the DDC systems of an Existing Facility?

11. What Is That Most Consulting Engineers Are Doing Poorly? How to Properly design and specify control systems?

Proposed Tracks for 2019 Atlanta Winter Conference Jan 12 - Jan 16, 2019
Track 1: Systems and Equipment
Track 2: HVAC& R Fundamentals and Applications
Track 3: Refrigeration
Track 4: Construction, Operation and Maintenance of High Performance Systems
Track 5: Common System Issues and Misapplications
Track 6: The Convergence of Comfort, Indoor Air Quality and Energy Efficiency
Track 7: Building Integrated Renewables and Natural Systems
Track 8: The Engineer's Role in Architecture

Proposed Tracks for 2019 ASHRAE Annual Conference in Kansas City, MO:
Track 1: Systems & Equipment in the Built Environment
Track 2: Fundamentals and Applications
Track 3: Optimization in HVAC&R
Track 4: Commissioning New & Existing Buildings
Track 5: Occupant Health & Safety
Track 6: Modeling Throughout the Building Life Cycle
Track 7: Professional Development
Track 8: Research Summit
Track 9 Radiant Heating & Cooling Mini-Track

2019 ASHRAE Winter Conference in Atlanta, January 12-16:
a. Conference Papers are due July 9
b. Seminar, Forum, Debate, Panel and Workshop proposals are due August 3
c. Program notifications go out September 14
d. Web site opens for presentation uploads on November 30
e. All presentations due online January 4, 2019
2019 ASHRAE Annual Conference in Kansas City,
a. Conference Paper Abstracts, Technical Papers and Paper Session requests due August 21, 2018
b. Conference Papers due November 30, 2018
Potential Sources Bias Disclosure: In accordance with the ASHRAE Code of Ethics, speakers have been asked to fill out a potential sources bias disclosure document that will note affiliations/ involvement with any organizations with financial or commercial interest in the subject matter to be discussed.
Program Types
Technical Paper Session: These sessions present papers on current applications or procedures, as well as papers resulting from research on fundamental concepts and basic theory. Papers presented in these sessions have successfully completed a rigorous peer review. Forms for written comment are available at each session and sent to respective authors for reply and publication in ASHRAE transactions, if received by a certain date.
Conference Paper Session: These sessions present papers on current applications or procedures, as well as papers reporting on research in process. These papers differ from technical papers in that they are shorter in length and undergo a much less stringent peer review.
Seminar: These sessions feature presentations on subjects of current interest. There are not papers attached to seminars.
Workshop: These sessions enable technical committees and other ASHRAE committees to provide a series of short presentations on a topic requiring specific expertise. These short presentations are provided with an increased emphasis on audience participation and training in a specific set of skills. There are not papers attached to workshops.
Forum: The sessions are “off-the-record” discussions held to promote a free exchange of ideas. Reporting of forums is limited to allow individuals to speak confidentially without concern of criticism. There are not papers attached to forums.
Panel Discussion: Panel discussions can feature a broad range of subjects and explore different perspectives on industry related topics. This session format includes a panel of 3-4 speakers each addressing a facet of the session topic, followed by an interactive discussion lead by the session chair. Panel Discussions may be 60 minutes or 90 minutes in length and will be posted online in the Virtual Conference.
Debate: Debates highlight hot-button issues commonly faced by our membership. Industry experts, either on teams or as individuals, argue opposing sides of an issue, concluding with position summaries and audience

feedback. Debate sessions may be 60 minutes or 90 minutes in length and will be posted online in the Virtual Conference

Presentations and Guidelines:
1. Conference Paper vs. Technical Paper: Conference paper is limited to eight (8) pages, the timeline is shorter and the review process less rigorous than the technical papers currently presented in the Technical Paper Sessions.
2. Seminar and Forum Submissions: For Seminar submissions, they should include six (6) Learning Objectives and ten (10) Questions and Answers for the session.
3. Seminar Program Submission: 60 minutes (1-2 speakers) or 90 minutes (3-4 speakers).

Upcoming Meetings:
2018 Summer – Houston, Texas, June 23 - 27
2019 Winter – Atlanta, Georgia, January 12 – 16
2019 Summer – Kansas City, Missouri, June 22 – 26
Reminder:
✦ *Conference Paper vs. Technical Paper:* Conference paper is limited to eight (8) pages, the timeline is shorter and the review process less rigorous than the technical papers currently presented in the Technical Paper Sessions.
✦ *Seminar and Forum Submissions:* For Seminar submissions, they should include six (6) Learning Objectives and ten (10) Questions and Answers for the session.
✦ Seminar Program Submission*:* 60 minutes (1-2 speakers) or 90 minutes (3-4 speakers).

✦ ASHRAE Announcement: Conference, presentations will be REQUIRED to be uploaded before the conference opening onsite. If a presentation is not uploaded, the presenter will be assessed a strike, within our 3-strike program. If a presenter collects three strikes, he/she will not be selected to present at another ASHRAE conference.

These minutes stated herein were approved by TC1.4 program subcommittee on Sunday, June 24, 2018.
Submitted by: Frank Shadpour, PE
TC1.4 Program Subcommittee Chair
frank@scengineers.net

1711-RP Advanced Sequences of Operation for HVAC Systems – Phase II Central Plants and Hydronic Systems

Progress Meeting held on Tuesday June 26, 10:30AM Room 330 at the Hilton Americas, Houston TX

In attendance:

PMS	Project Incumbent	Guests
Marcelo Acosta	Brandon Gill	Chariti Young
Joseph Kilcoyne	Reece Kiriu	Jim Coogan
Barry Bridges		
Chad Moore		
Mark Hegberg		

1- The PI presented and explained the 3rd version of Task 2 report (English language sequences of operation), which was submitted on June 15.
   a. Although the PMS hadn't had time for detailed review, the first pass review identified most previous comments had been addressed and only editorial items were found.
   b. Mark Hegberg suggested an improved way to layout the schematics in the report and modified one as an example, which was provided to the PI.
      i. The PMS and the PI agree this layout is clearer and the PI will assess the effort required to modify all schematics produced so far.
   c. Barry Bridges provided suggestions to systematically produce acronyms for improved clarity.
2- The PMS will provide additional comments on the report by July 20, 2018.
3- The PI will immediately start working on Task 3 (Logic Diagrams)

Meeting Adjourned at 11:20AM