Dispersing Heat Through Conviction

The Funnier Side of Process Control

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Preface

How do you work thirty years doing process control for a big corporation, spending most of the time on the road, and maintain your sanity? Well, don't ask me. As you'll see, I lost mine a long time ago. So the technical content of the craziness that follows is well camouflaged and can easily be ignored.

Which means this book goes well with beer. In fact, the stronger the beer (Duvall's is recommended) and the more consumed, the more you will appreciate the features of this book. Just sober up before driving or trying to apply any of the insights gained. If you can remember them the next day, that is.

Over the years, I have been fortunate enough to find some similarly crazed individuals who have agreed to contribute to this book. Along with our contributions, you will also find actual documented quotations from control room operators, which were collected during journeys to the outer reaches of Iowa as well as various lists that we've compiled from our vast experience in the world of process control.

Bottoms up!

- Gregory McMillan

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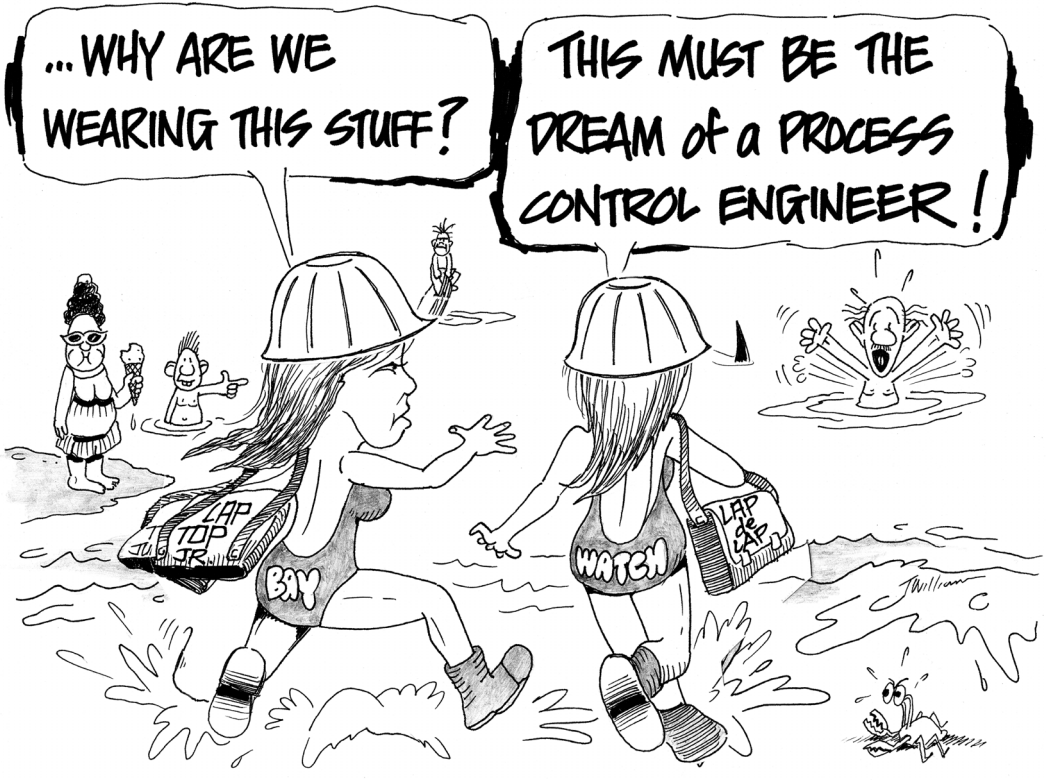
Itsy-Bitsy Teeny-Weenie ...

Think of the smallest thing you encounter in your job. No, not your last raise, your next raise, or for that matter, all of your future raises put together. And, no, not the size of your stock options compared to upper management's, or upper management's contribution to revenue, or their appreciation of your value. (What if upper management were made up entirely of stock analysts? Instead of salaries, would employees be told to "go public" with itsy-bitsy teeny-weenie stock offerings to represent their individual value? Would press releases about their individual goals help drive up the price of their stock so much that it would split? Would the number of shares become just itsy-bitsy teeny—with no "weenie"? Would this lead to an itsy-bitsy teeny career—with the weenie gone?)

Anyway, back to itsy-bitsy teeny-weenie—and we haven't even mentioned yellow polka-dot bikinis. (That would mean giving equal space to Speedos. As a discussion of teeny-weenie Speedos could be misconstrued, let's move on to the technical issue: the smallest thing you encounter in your job.) It's critical to ensure that sensitivity and resolution limits and the noise in your loop are itsy-bitsy teeny-weenie. (See, this *is* technical, after all.)

It turns out that noise and resolution and sensitivity limits are the largest unrecognized source of dead time in your control system. You won't find this in the literature. It isn't because engineers have an itsy-bitsy teeny-weenie


...WHY ARE WE WEARING THIS STUFF?
THIS MUST BE THE DREAM of a PROCESS CONTROL ENGINEER!
LAP TOP JR
BAY
WATCH
LAP de CAP

From The Control Room…

"You gotta watch your coffee cup around here, because if you set it down, Cole will eat it."

— Kay

"The next batch is the one after this one."

— Greg

"I can't live on what we live on."

— Cheri

understanding of technical issues, like upper management. It's mostly because the academic treatment of process control has only an itsy-bitsy teeny-weenie relationship to what is really important.

When a signal is within the resolution or sensitivity limit of the measurement or final element, dead time can be virtually infinite. If the measurement is within the noise band, the loop cannot distinguish a real upset from noise. The control limit is the largest of (1) the final element resolution limit multiplied by the product of the final element gain and process gain, (2) the sensor sensitivity or repeatability limit, (3) the analog-to-digital converter (A/D) resolution limit, or (4) the noise band. For a properly tuned temperature and level loop, this limit is often larger than the error from a disturbance.

If the signal is ramping and will eventually exceed these limits, the dead time is the resolution or sensitivity limit divided by the ramp rate. For example, if the rate of change of temperature in a large vessel is 0.1° Fahrenheit per minute and a thermocouple with a sensitivity of 0.1° Fahrenheit is used, the additional dead time is one minute. If a thermocouple input card of a distributed control system (DCS) is used with a span of 1000° Fahrenheit, the additional dead time is five minutes because of the A/D resolution of 0.5° Fahrenheit (twelve-bit A/D with one sign bit). If a control valve is used that has a resolution limit of 5 percent because of a key lock connection or worn teeth in a rack-and-pinion actuator, the additional dead time is ten minutes for a controller output changing at the rate of 0.5 percent

per minute (controller gain of five and a scale span of 100°). You can estimate similar amounts of dead time for level sensor sensitivity and control valve resolution for level control in large vessels where the level rate of change is 0.1 inch per minute. For this level, it will take ten minutes to get out of a noise band of one inch.

One solution is better equipment. The sensitivity of a resistance temperature detector (RTD) is ten times better than a thermocouple's. The repeatability of a RTD is twenty times better than a thermocouple's (0.1 versus 2° Fahrenheit) for temperatures below 600° Fahrenheit. For distillation columns, reactors, and crystallizers, this improvement in repeatability translates to better quality and yield because of tighter composition control.

For electronic components, once the signal exceeds the resolution or sensitivity limit, the additional dead time is essentially zero. However, for control valves and other devices with pneumatic components, the dead time gets exponentially larger as you approach the resolution limit because of nozzle flappers. For example, if a positioner has a resolution of 0.5 percent, the dead time would grow from two seconds for a step change of 2 percent in controller output to forty seconds for a step change of 0.6 percent.

So itsy-bitsy teeny-weenie can make a big difference. But be warned. If you tell your manager that you are going to replace all of the pneumatic positioners in the company with digital ones, the dead time between your raises will exponentially increase from two years to forty years.

From The Control Room…

"I know him, but I don't know his name."

— Rick

"Hey, where are you going in Wisconsin?"

— Bill, to Jeff, who is looking at the map of Missouri

"I'm going to work every ounce of overtime this year."

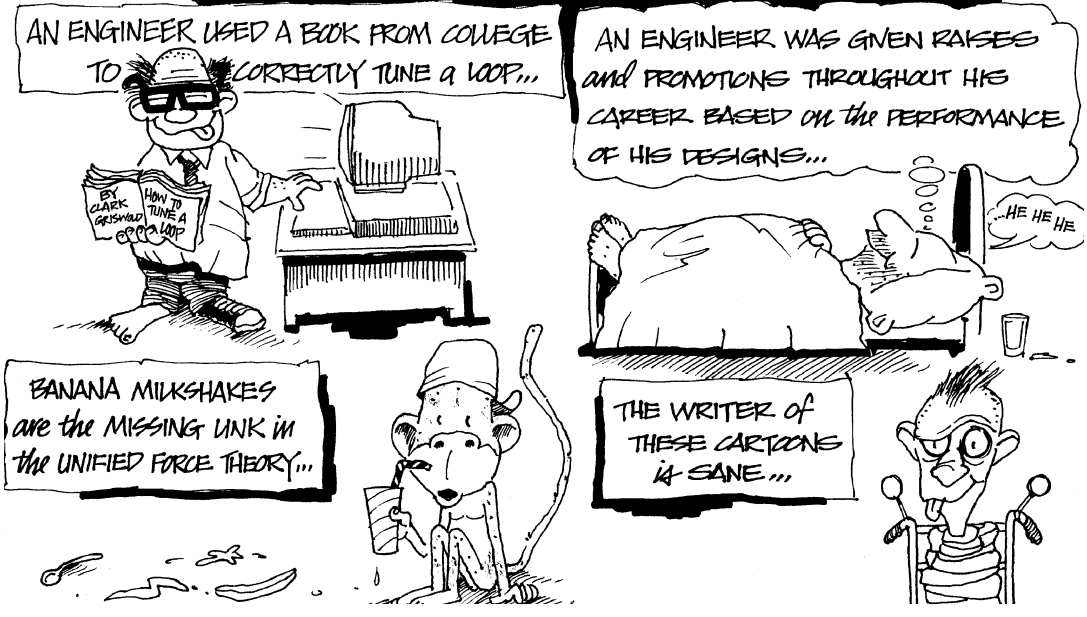
— Bill

2

Believe it … or Don't (Part I)

- A young engineer told the CEO that there were too many presidents. The CEO thanked him profusely and immediately transferred half of the presidents to the plants to configure DCSs.
- A project manager found a major design flaw in the control system after carefully reviewing the drawings and immediately authorized the purchase of instruments to solve the problem.
- After encountering major problems meeting product quality specs, a process engineer said, "The instruments are right; it must be the process that is screwed up."
- Someone once read an entire book on control theory.
- An engineering flow diagram was drawn with control strategies that didn't resemble anything ever done before.
- A reagent control valve for low viscous flow was sized according to laminar flow equations.

BELIEVE IT OR DON'T



From The Control Room…

"I get so flustrated playing Ninetendo."
— Brian

"Do Lebanese live in Lebanon?"
— Pughba

- A vortex-shedding flowmeter actually achieved the stated 15:1 range.
- A DCS's computational power was fully utilized to do advanced control strategies.
- An air conditioner was installed that was quiet and exactly the right size for the configuration room, eliminating all cases of frostbite.
- An interlock was functionally tested periodically from sensor to final element at actual operating conditions.
- A book was published that clearly explained how to design instrumentation grounding systems.
- A control valve spec actually stated that the valve "must respond."
- A control theory specialist invented a model predictive controller that correctly picked the winner of the last Miss Universe contest.
- A chemical plant was designed, checked out, and started up without any changes.
- An engineer used a book from college to correctly tune a loop.
- An engineer was given raises and promotions throughout his career based on the performance of his designs.

- Banana milkshakes are the missing link in the unified force theory.
- The author of these lists is sane.

Believe it! … or don't.

From The Control Room…

"Who's going to win the Rose Bowl, Iowa or Illinois?"
— Ginger

"A whole drum of trailers."
— Don

"He went diving with a British guy and another guy from England."
— Sodba

3

Roseanne Roseanadanna Does Detroit: A Monologue

So the section leader says to me, “Did you tune the loops at our Detroit plant, Roseanne Roseanadanna?”

“Detroit?” I says to him, “Let me tell you about Detroit. Have you ever walked into a control room and found most of the loops in manual? So you ask the operator what is wrong, and he says, 'It has been a long time if ever since these loops were in automatic.' So I ask the chief operator if I can tune the loops, and she says, 'We prefer manual so we can stay at the sweet spot.'”

Now I knew *my* sweet spot was not in this control room, so I ask, “What is so sweet about running as lousy as this plant?” I figure the operator’s sweet spot is that nice chair over there. So I, Roseanne Roseanadanna, add, “If I don’t tune these loops we will both be looking for a sweet spot in the unemployment line.” The operators reluctantly reply, “OK. Just make sure you keep both the measurement and the control valve from moving.” Now, how am I going to do that? I figure the best I can do is keep them from moving toward me and locking me up in a cabinet, so I say, “I just want to look at the settings.” Would you believe all the loops had a gain of one and a reset of one (no need to ask whether it is repeats per minute or minutes per repeat)? So I


WE HAVE SO MANY PROBLEMS WITH THE SENSING LINES, WE NEED ACCESSIBILITY!
...WHY IS THIS D/P MOUNTED IN the SHOP?
TOMATO

From The Control Room…

"That's what you got forward to look to."

— Brian

"Do you want me to re-put it?"

— Brian

"I wasn't looking at what I was looking at."

— Nick

figure maybe these loops just need to be tuned and my leader was right, but first I should look at what is in the field.

So I, Roseanne Roseanadanna, go outside, and all I see are sensing lines running all over the place, I mean up and down, sideways and long ways. Some are so long, I can't see where they start or end. Some bend and twirl so much I get dizzy looking at them. Some are traced, some are insulated, and most of them are plugged. I ask where the transmitters are located, and the field operator says, "In the instrument shop since they have so much trouble with them." Something about being mounted for greatest accessibility.

I could just die.

Then I see the control valves, and I figure I must be in process control hell … or Jersey. The valves had these on-off piston actuators with little teeny tiny positioners. So I look in the positioner, and I don't see anything. I mean nothing at all, just a sticker saying like "Inspected by Number 3." Now who is Number 3, and why didn't he notice the cupboard was bare? Is his brain as empty as this box? He sure did a little number on me. Then I look for the I/P, and instead I find pneumatic tubing that runs farther than the eye can see with a telescope.

I was so upset, I could have just puked and died or maybe both.

So the section leader says to me, "Don't worry, Roseanne Roseanadanna, I have the solution to your problems. We have just approved a project to install an expert system and neural networks."

And I says, “How much money do we have to fix the instrumentation and control valves?” So he says, “None. All of the money is for software and consultants.” So I says, “Who is the naïve, dumb fool you are going to get to start up this project?” And I’m thinking to myself, why do they call him a section leader, and not a section manager, and it’s like section managers became extinct in the late 1990s, although section leaders sure sound and act a lot like section managers? So he says, “This is a great opportunity for you.”

It just goes to show: it is always something.

From The Control Room…

“It's really neat out on the ocean at night when the sun and the moon are out!”

— Bill

“There's enough vacuum on that to suck the guts out of a billy goat.”

— Gary

4

Top Ten Lists from All Over the Place

Top Ten Signs You Travel too Much

10. You dial nine at home to get an outside line and zero to get a wakeup call.
9. Your office associates think you took the last retirement offer.
8. Your trip number exceeds the allowable number of digits.
7. You mistakenly drive to the airport instead of work.
6. You leave a tip at your dinner table.
5. You ask your spouse for room service.
4. Your kids are silent since they are taught not to talk to strangers.
3. You believe the TWA stock price is tied to your travel plans.
2. Suddenly, the crash odds of one in a million don't sound so good.
1. You are mistaken for the Pillsbury Doughboy.


CAN I GET a WAKE-UP CALL for 6:00 A.M.?
...I'LL GIVE YOU A WAKE-UP CALL RIGHT NOW!
HEY... WHO IS THAT MAN?
LAP SR.
FRIED CHICKEN
SCOTLAND ? HA!

From The Control Room…

"It was heated up, so it was hot."
— Jay

"He may have to work one or two Saturdays a week."
— Sharon

Top Ten Reasons to Spin off the Chemical Business

10. Double your stock and double your fun.
9. Without chemicals, life itself is impossible, but sustainability becomes a nonissue.
8. Repeat after me, "Roundup is not a chemical, Roundup is not a chemical …"
7. Chemistry books never made the best-seller list.
6. The TV series pilot "LA Chemical Engineer" got a negative audience share.
5. You never have enough stock.
4. "Bob's Food and Drugs" has a nicer ring to it.
3. If you can't eat it, who wants it?
2. Outlet stores for chemicals never really had a chance.
1. The flying saucers waiting for us need food.

Top Ten Exceptional Values

10. A measurement without error.
9. A valve without dead band.
8. A loop without dead time.
7. A controller that is tuned.
6. A process that is simulated.
5. Any computer not approved by IT.
4. Any canceled all-week team-building exercise.
3. Any afternoon meeting at the Lake Travis Oasis.
2. Any business trip to the San Diego Marina.
1. Rub-a-dub-dub, three in a tub in Marshalltown.

From The Control Room…

"He smokes like a fish."

— Don

"It's not better than nothing, but it's better than something."

— Bill

5

Flowmeter Stardate 2057.5

Scene: A phaser blast has just hit the engineering deck of the Starship Enterprise. The Klingons appear to have the upper hand, and things don't look good for the crew of the Federation's flagship.

Scotty. “Captain! The antimatter reactors are off line, and I need two hours to get them back up.”

Kirk. “Scotty … I don't have … two … hours.”

Spock. “To be precise, I project that the Klingons will be able to breach the outer hull in 1 hour, 23 minutes, and 42.8 seconds.”

Kirk. “Never tell me the real time. Bones, get down there and help Scotty.”

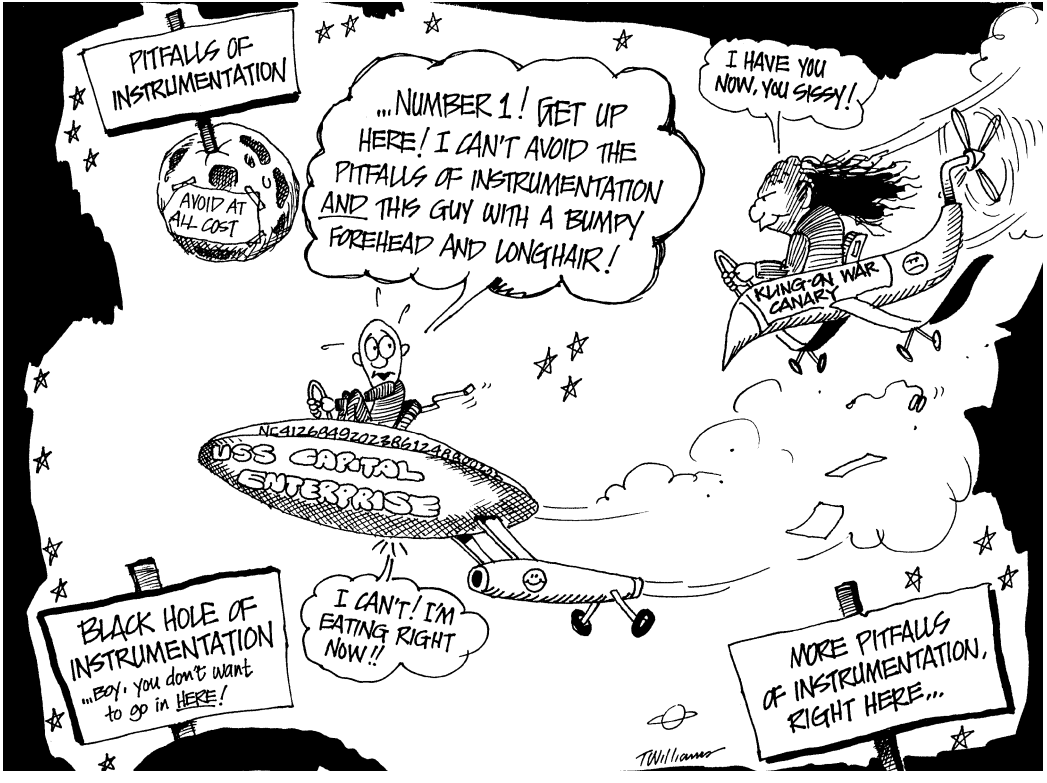
McCoy. “Dammit, Jim. I'm a doctor, not an engineer. Get Spock to do it.”

Spock heads toward Engineering.

Spock. “What is the problem, Mr. Scott?”

Scotty. “Och, I’m nae sure, Mr. Spock.”

Spock. “Logic suggests that one must know what the problem is before one can solve it.”


PITFALLS OF INSTRUMENTATION
AVOID AT ALL COST
...NUMBER 1! GET UP HERE! I CAN'T AVOID THE PITFALLS OF INSTRUMENTATION AND THIS GUY WITH A BUMPY FOREHEAD AND LONGHAIR!
I HAVE YOU NOW, YOU SISSY!
KLINGON WAR CANARY
USS CAPITAL ENTERPRISE
I CAN'T! I'M EATING RIGHT NOW!!
BLACK HOLE OF INSTRUMENTATION
"BOY, YOU DON'T WANT TO GO IN HERE!
MORE PITFALLS OF INSTRUMENTATION, RIGHT HERE...
TWilliams

From The Control Room…

"All it would take is a phone call from a number of people."
— Mike

"If you're here, you'll be gone."
— Frosty

Scotty. "Aye, and if I knew, I surely would. But I surely don't."

Spock. "I believe you do, but so much is going on that you can't sort it out. We must meld minds."

Joining minds, Spock determines that the main antimatter feed flowmeter to the reactor has been destroyed and needs to be replaced. Scotty looks in ship stores and finds these are his choices for replacement:

1. A mass flowmeter that will give you multiphase and multicomponent mass flow rates. Ideal for antimatter.

2. A meter that allows you to track individual molecules for traceability. A radioactive isotope is injected and attached to the key molecules and provides the flow rate by monitoring the radioactive emissions.

3. An infrared meter that can detect temperature gradients on the outside of the pipe and can correlate this into flow.

4. A laser flowmeter that uses distortions in a light beam to determine flow rates. The meter can also serve as a spectrometer and analyze components at the same time.

5. An energy meter that can calculate mass flow using Einstein's $E=MC^2$ equation. The calculation can be performed in discrete increments to give you mass flow rates.

Scotty makes his choice and has the reactor back up on line in thirty minutes.

Kirk. “Let's get out of here, Scotty.”

Scott. “I'm giving it all she's got, Captain.”

The Enterprise warps safely away. What was Scotty’s choice? See page 124 at the back of the book for the answer.

— Chris Toarmina

From The Control Room…

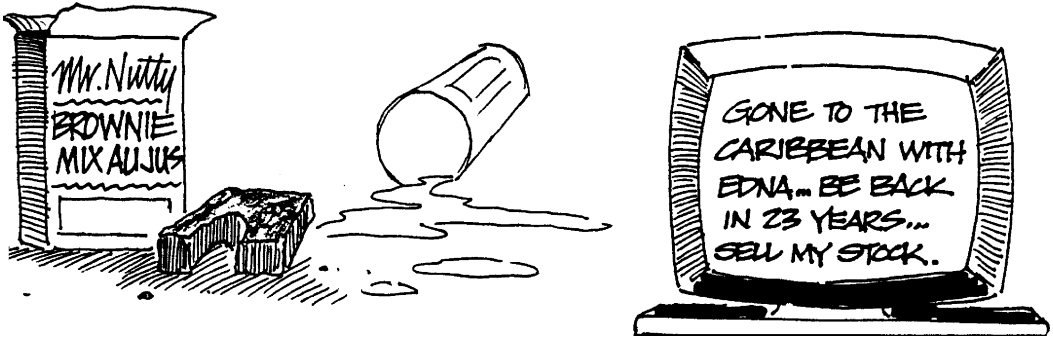
“The people that don't say anything, don't say anything.”
— Billy

“Would somebody put a note in the logbook, nobody will be at the tech plant from noon tonight until …“
— Dave, who never made it any farther

6

Self-Test of Basic Process Control Knowledge

1. A process control engineer is:
   a. Born every five minutes.
   b. Made on the job.
   c. Found in an alley.
2. You hear a project manager say that he doesn't care how much the installation cost, just as long it works. This is because:
   a. The project manager finally realizes what is best for the company.
   b. The project manager is antimatter from a parallel universe where everything is the opposite.
   c. You are suffering from a mind-disorienting fever.


Mr. Nutty
BROWNIE
MIX AU JUS
GONE TO THE CARIBBEAN WITH EDNA... BE BACK IN 23 YEARS... SELL MY STOCK.

From The Control Room…

"Pintos and Escorts are not really Fords."

— Billy

"I got it right on the tip of my brain."

— Bill

3. A process engineer does the software configuration for you. This happens because:
   a. She knows how to implement control strategies better than you.
   b. You are a wimp.
   c. You went on a Caribbean vacation and never came back.
4. You only looked at the cartoons in the book *How to Become an Instrument Engineer*. This indicates that:
   a. You think a picture is worth a thousand words.
   b. You heard the book was a graphic exposé.
   c. You don't know how to read.
5. A vendor offers you tickets to a fishing show because:
   a. He genuinely likes you and prefers to spend free time with you.
   b. The ballet was sold out.
   c. No one else wanted to go.

6. A project has ninety-nine engineering flow diagrams because:
   a. It is a very large job.
   b. It is a time and material job by a contract engineering firm.
   c. The computerized drawing numbering system only allows two digits.

7. An engineer calculated the dynamic unbalanced forces on a control valve trim to the third decimal place because:
   a. It was critical to correctly size the actuator.
   b. She got a new personal computer and software package.
   c. She suffered a time warp back to college and calculus homework assignments.

8. Which requires more maintenance?
   a. A magnetic flowmeter.
   b. An orifice flowmeter.
   c. Joan Collins.

From The Control Room…

"Harder than the hubs of hell."
— Marv

"Nobody goes to the third floor for a reason."
— Cole

From The Control Room…

"Today was very quiet, no problems and no Cliff.

"Today was also a very quiet no-problem-day, and no Cliff.

"Things got back to normal. Cliff was back."

— Seen in a logbook

"You need to grab it with a tentacle and bring it back to your nucleus. You know what I'm talking about, don't you?"

— Clifford, using his newfound redesignspeak, during a conversation that ended shortly thereafter

9. How do you decide what distributed control system (DCS) to use?
   a. You choose the lowest bidder.
   b. You choose the one that you know best how to use.
   c. You choose the one whose displays most impress your upper management.

10. How do you size a control room?
   a. You lay out all the panels specified (to date) dimensionally.
   b. You do (a) and double it.
   c. You choose the largest size you can get away with.

11. How do you do sequencing and interlocks?
   a. However your DCS vendor tells you to.
   b. Very carefully.
   c. How do you do, yourself? But my name is Greg, not Sequencing and Interlocks.

12. What is best?
    a. A grounding system in which everything is grounded at least once.
    b. A grounding system with separate and parallel instrument ground conductors tied to one good earth ground.
    c. A banana milkshake.

13. You are asked to start up a piece of packaged equipment. Your best bet is to become:
    a. A friend of the vendor and find out everything he or she knows about the equipment.
    b. A friend of a shrink who will get you excused with an insanity plea.
    c. An ex-employee.

From The Control Room…

"You're just dispersing the heat through conviction."

— Marv

"… by that Bettis actuated valve that shuts and goes close."

— Bill

From The Control Room…

"What is that other city besides Florida they go to?"
— Mary, talking about spring break

"Piecework got started as an incentative."
— Marv

14. Which of the following shouldn't be an instrument?
    a. A DCS.
    b. A ruptured disc.
    c. A broken level gage glass.
15. Which of the following can be used to solve a control problem?
    a. Control theory.
    b. A seer.
    c. Scotty and warp drive.
16. What excites instrument engineers the most?
    a. The opportunity to buy Savings Bonds.
    b. The end of around-the-clock coverage.
    c. The Flintstones.

17. If a graduate student invents a new algorithm that always outperforms a PID controller, it must be the result of:
    a. Years of diligent study.
    b. Divine revelation.
    c. A freak break in the space and time continuum of the academic world.

18. The Instrument Engineer's Hall of Fame is located in:
    a. Springfield, Massachusetts.
    b. The author's imagination.
    c. 128th Street in the Bronx.

19. If you selected (a) as the answer to each of these questions:
    a. Your are "one righteous dude" (or dudess).
    b. You have management potential.
    c. Your are suffering from exposure to kryptonite.

From The Control Room…

"She's the more stupider of the two."

— Rike

"We had them both bone empty yesterday."

— Bodine, referring to NH_4Cl silos

7

The X-Vials

Scene: Scully and Mulder are en route to investigate a problem at a top secret government chemical facility. When they arrive at the gate, a guard is on duty.

Guard. “Your ID, ma’am?”

Scully, flashing her badge. “Agent Scully. Federal Bureau of Instrumentation. We're here to see Mr. Johnson.”

Guard. “Hold on, ma’am. I’ll see if he is available.”

He turns away and mumbles in a hushed voice. “Mr. Johnson, Agents Scully and Mulder to see you. Yes sir. Yes sir.”

He hangs up and turns back to them. “Proceed to the Administration Building. Do not deviate from the direct path. Mr. Johnson will be waiting.”

A few minutes later.

Johnson. “Scully and Mulder, I'm glad you could make it on such short notice. We've been having problems with a mass meter in our neutralization reaction area. We're using it to meter in our reagent, but it doesn't seem to be giving us good readings.”


YOU'RE RIGHT, MULDER... THAT D/P CELL IS UNLIKE ANY I'VE SEEN ON THIS PLANET!
...GOT ANY LAWNMOWERS?
SALE TODAY ON SPACE ALIEN INSTRUMENTATION STUFF - PLEASE, NO SALES TO UNDERCOVER FBI AGENTS
LOCH NESS 3 KM.
STONEHE ADDO
KOBUR
T.Williams

From The Control Room…

"It's inevident that I'll have something else planned."

— Bill

"You know how when you're on midnight to noon you get zombilized?"

— Rike

Mulder. "Let's see the installation."

On their way to the reaction area, Mulder notices some large glass vials being loaded into boxes for shipment. The chemical inside is something he has never seen before … something almost alien looking. It is green and viscous, yet from another angle it looks solid and purple. A spectrometer has been used to sample the vials for defects. The rejected vials are being shipped to another part of the plant.

Johnson. "Here's the mass meter."

Mulder. "What chemical do you make here?"

Johnson. "I can't divulge that information."

Mulder. "At least tell me what it is used for."

Johnson. "I can't tell you that either."

While Mulder tries to get information on what was in the pipes, Scully examines the installation.

Scully. "It seems to me, Mr. Johnson, that the mass meter is installed too close to the pump, and also there aren't enough supports on the pipes. Large vibrations can corrupt the signal. In addition, since your reagent is a liquid, it is important that the meter always remain flooded. Air trapped in the meter can cause inaccurate readings. I recommend mounting the meter in the vertical."

As Scully finishes her diagnosis, a factory worker approaches Johnson asking for some help in another part of the plant. Johnson excuses himself.

Mulder. “It’s obvious to me that this place isn't your run-of-the-mill chemical plant. These guys are making a strong alien neurotoxin in an attempt to take over the world. The green vials are being shipped to all the important military installation both here and abroad. At precisely 3:00 P.M. on January 6 the vials are set to rupture, releasing the neurotoxin and completely immobilizing our military forces. The people who come in contact with the substance by touch or smell will be instantly affected. Gas masks and other air purification systems will have no effect because the toxin is actually a microorganism able to seek out and attach to its host.”

Scully. “Mulder, you're always so quick to raise the conspiracy flag. If your theory were true what would prevent the organism from attacking its creator?”

Mulder. “The way I figure it, the government has altered our DNA by distributing an antiflu vaccine with a hidden genetic scrambler. The bug is smart enough to be able to latch on to people with genetically altered DNA and start destroying white blood cells, leaving its victim virtually defenseless against disease.”

From The Control Room…

“Cole is in the shower, and that's where I'm gonna be.”

— Jay

“Hey Tom, what's in the methanol tank?”

— Rick

“We're not making much headground are we?”

— Don

From The Control Room…

"… a year from now, today."
— Lanny

"Do you ever flux your teeth?"
— L.P.

"It makes a difference because now they monitor you for a minute instead of sixty seconds. No, really!"
— Don

Scully secretly grabs a sample of the toxin and using her field-expandable, fully equipped genetic engineering lab performs some quick tests. Within minutes she has her results.

> Scully. "I can't explain it Mulder, but everything you said this chemical would do, it can do."

They arrest Johnson and shut down the whole facility, once again exposing the government and saving the world.

— Chris Toarmina

8

Self-Test of DCS Configuration Knowledge

1. How do you estimate the configuration cost of your DCS?
    a. Carefully figure the number of hours required to complete the control definition, recipes, operations, interlocks, and database.
    b. Ask an experienced configurer how much time was spent on a similar job (if he or she is still coherent) and double the number to allow for meetings, management courses, and DCS enhancements.
    c. Choose the largest number you can get by your project manager.
2. How do you learn to configure a DCS?
    a. Rent a U-Haul trailer, fill it with DCS instruction manuals, take a leave of absence, and read every page.
    b. Go to a DCS configuration school and hope your first job consists of emptying and filling a couple of water tanks.

c. Find the simplest and safest application with the lowest profitability, visibility, and priority. Convince your boss you are the only one who can configure a DCS for it, and ask a most excellent configurer to tutor you.

3. You have a hundred virtual points. This means you are:

   a. A virtuous person.
   b. A graduate student studying data highways.
   c. Headed for a communication breakdown between your controller and the data highway as well as you and your project manager.

4. You are convinced that you don't need real-time simulation to test your DCS configuration. This means you are:

   a. Good at hiding start-up costs.
   b. Starting up a plant in Hawaii.
   c. Scheduled for early retirement and see a bright future in fixing configuration problems as a contract engineer.

From The Control Room…

"I didn't refuse, I just said no."
— Sue

"He became a consumer of strip joints."
— Brian

"That would solve the solution."
— Marv

From The Control Room…

"Whose fault did they come down on?"

— Bill

"She either works at the basket company or the biscuit place."

— Don, talking about his sister-in-law

"We need to heat that up and get rid of some of that wet water."

— Cole

5. An operator's console has no active alarms. This means you have:
   a. Figured out how to use every feature of alarm group states to suppress unnecessary alarms.
   b. Perfect instruments and operators and an especially smooth-running process.
   c. Forgotten to download the console.
6. Your configuration for the DCS fits in one small binder. This means you have:
   a. Demonstrated incredible conciseness in your code.
   b. An application that involves emptying and filling two water tanks.
   c. Forgotten to do the database.
7. You have 1,001 syntax errors. This means you have:
   a. An incredibly complex application.
   b. A computer virus.
   c. Forgotten a comma.

8. You think you have the best of all possible controllers in the best of all possible DCSs. This means you:
   a. Have installed the systems of all the major competitors.
   b. Have suffered a time warp back to the era of Voltaire.
   c. Are a DCS sales engineer.

9. You write fan letters to the technical writers of the documentation for your DCS because you are:
   a. An avid reader of technical writing.
   b. Ardently collecting binders as a hobby.
   c. A former employee of the DCS rep who is making big bucks as a contract engineer doing configurations.

10. If you met the originators of the first configuration workstations and error message set, you would be most likely to:
    a. thank them profusely for promoting creativity.
    b. ask them their planet of origin.
    c. tie obsolete workstations to their waists and take them for a swim.

From The Control Room…

"What do you wrap your 'foil-wrapped chicken' in?"
— Purdy, to Peking restaurant

"Did you hear Jeffrey Dahmer pleaded 'not innocent?'"
— Rick

"She's going to live to keep living."
— Rick

9

D2 — Judgment Day 2000

Dateline: April 1, 2000—Who would have guessed that the Four Horsemen of the Apocalypse were in reality a four-digit number, 2-0-0-0. As the millennium neared, many believed that the world was coming to an abrupt end. And that would have been extremely bad for business. The Chinese reportedly thought there was no issue because that year was the Year of the Dragon. Believe me, such dragons have teeth and will burn you with fiery breath if you let them. Thank God that we are not a binary society, otherwise we'd go through this every other year.

For control engineers, "Y2K" turned into the project from hell. The best they could hope for was to spend a lot of money and maintain status quo; and when it was all over, management would ask, "Why did we spend all that money, when nothing happened?" In truth, the Y2K problem was real in process control systems, though the fixes for it resulted in no increases in productivity and provided no benefits. At first, many thought it was only an IT problem. After all, why would a PLC on the shop floor care what date it was? Unfortunately, when we looked closer, we found that many systems were "date aware," and some were even integrated into business systems. Later, the whole issue of embedded systems arose, which further complicated the problem. The term *embedded system* seems to have been created by high-priced consultants that really meant they wanted to get "in bed" with the poor


...THINK, BILL, THINK! HOW CAN YOU MAKE ME RICH!?
...THINK, BILL, THINK! HOW CAN YOU MAKE YOURSELF RICHER, AND LOSE THESE CLOWNS!?
...THINK, BILL, THINK! HOW CAN YOU MAKE ME RICH!?
...and WHERE'd you get that haircut?
...SCRITCH SCRITCH SCRITCH...
T Williams

From The Control Room…

"His mama is burning up all his inheritance because she won't die."
— Rick

Jeff: *"When's Terry coming back?"*

Ray: *"Wednesday or Wednesday morning."*

"They can make that wind do a complete '160.'"
— Rick, about the capacity of the MIDAS weather computer to simulate wind conditions

control engineers and give them the shaft. However, research uncovered computer BIOS chips that had problems, so the "embedded system problem" really did exist as well.

Some myths about embedded systems persisted. One was that a system had to have a real-time clock to have a problem. Whether it had one was not always easy to determine. Also, some people believed that any microprocessor-based device could have a problem purely because of its BIOS chip number and revision. The hardware chips were not the issue, however. The problem existed with the EPROM programs that were burned into the chips when they were installed on a circuit board by the OEM manufacturer. What this meant was that for a device to have a Y2K problem, the date that the EPROM program used had to be one that could be set. So, if the device had no communications port or keyboard for data entry, it could not have a year 2000 problem. There was only one exception to this rule: If a device had a battery backup, theoretically the date could have been set at the factory, and if its battery had never been removed that could be problematic. This was highly unlikely, though, and the solution was simply to pull the battery when the device was powered down.

One of the worst parts of the Y2K problem was that control engineers had to work closely with the IT people in charge of the effort. Many engineers didn't get along with them. Based on our knowledge of their work, it seemed to take them so long to do simple things. Also, the normal bull they gave businesspeople just didn't work with engineers since many of us were computer geeks too. They didn't like us either, and they especially hated

control engineers, who wouldn't run the normal programs and insisted on using specialized computers. (The biggest reason engineers don't get along with IT people is because the latter can get a degree in "computer science," a discipline that has nothing to do with science and is based instead on the current trend being set by Bill Gates. Engineers can't understand how a program will work one day and not the next day. When is the last time Ohm's law changed, after all? Computer systems change every time a ponytailed, tie-dyed-T-shirt-wearing, Diet Coke-drinking hacker in Seattle has a crazy whim.)

Another strange interaction that resulted from the Y2K problem was that engineers had to deal with lawyers. Engineers normally dealt with lawyers only as expert witnesses, long after they had retired and didn't care who they ticked off. (Engineers generally do not hold lawyers in high regard. But who does?) In most lawsuits, lawyers try to prove that an engineer is negligent. They do this by getting juries to think with their emotions instead of their minds. And lawyers were licking their lips over the Y2K rollover. The projections were that it would be the biggest cause of litigation the world had ever seen. The lawyers were ready to pounce. As the Y2K rollover neared, we had yet to find any process control equipment that would "just stop." This was the only good aspect of the problem. Generally, only some small part of functionality would be lost as a result of Y2K, but the devices kept controlling. It seemed highly unlikely there would be any safety or environmental problem.

As far as we can tell, the world has survived the year 2000. But it was a rough ride.

— Chris Toarmina

From The Control Room…

"Come on down up here."
— Pravin

"Somebody got on-hands training."
— Marv

"I hope she's broken out with acme all over her face."
— Donnie

10

Top Ten Terrifying Thoughts of Control Engineers Just Before They Fall Asleep

10. Will they eliminate the early retirement program? Will they run out of money just before I become eligible? Will I spend the rest of my life in a cubicle?

9. What if another nuclear engineer becomes president? Does an actor make a better president than an engineer? Is my manager an actor?

8. What if God is a lot like my boss? Will the ultimate performance review be a lot like last year's? Will my ratings depend more on what I didn't do than what I did do?

7. Could I be attacked by roving bands of project managers? What if they read the book *How to Become an Instrument Engineer*? What if they become violent? Will they wave knives and force me to say kind things about schedules and budgets?

6. Is the cafeteria a test site for the company's products? How do they concoct such weird colors and tastes? Was that the chief chemist I saw coming out of the kitchen?
5. What if the buyer goes out for quotes on my rush job? Will a request for bids be sought from the third world? Will my control valves be plastic and made in Taiwan?
4. Will I have to learn a new goals program? Will my automatic goals-verbiage-generating program be obsolete? What if I have to write goals for real events that support the idealized management goals of my boss?
3. How do Coriolis mass flowmeters work? How can I understand something I can't pronounce? If I stand on a record turntable, will I get a feel for it before I get knocked off by the needle?
2. Will I have to learn a new keyboard? What will I do when they change the mainframe terminals, personal computers, operator interfaces, and configuration workstations? Will my mind go blank, or will I suffer a mental meltdown and babble incoherently?
1. What if they gave the control room operators my home phone number?

From The Control Room…

Joe: *"Where did she move to?"*

Sue: *"North or south Virginia."*

Joe: *"Sue, think about what you said."*

Sue: *"I meant West Virginia and that other Virginia, but I don't remember its name."*

"It's supposed to rain tomorrow and Friday."

— John, on a Thursday

"We've got too many hands in the fire."

— Don

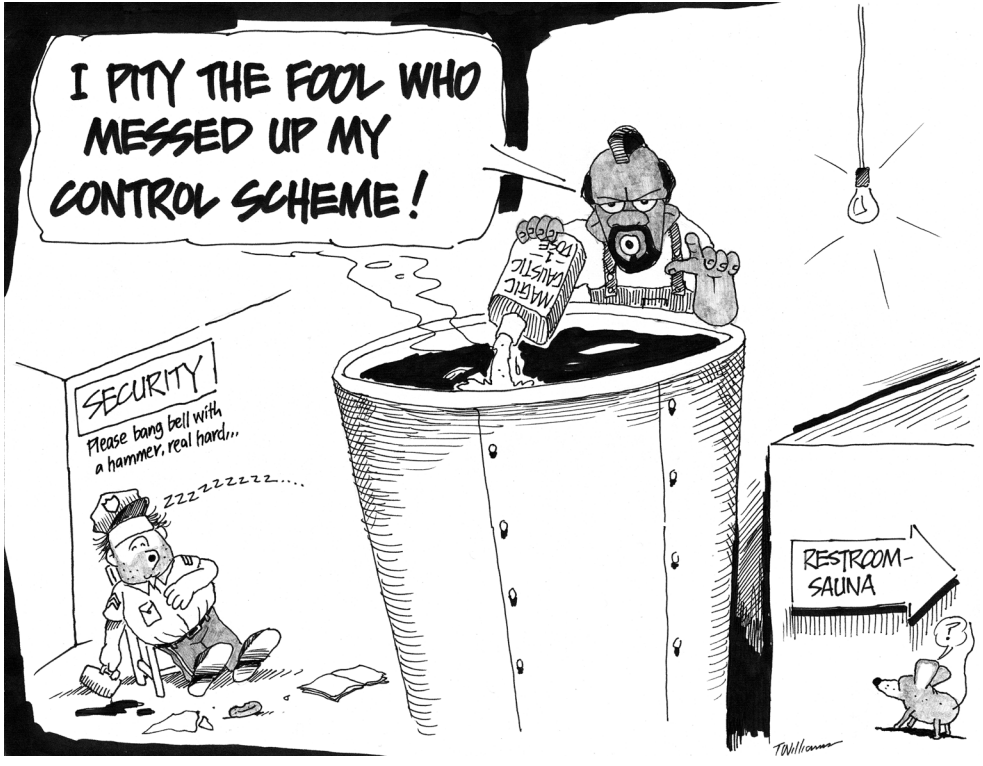
11

The C Team

As corporate downsizing became the norm during the late 1980s, a certain medium-sized chemical company, Chem-O-Inc, joined the movement. It laid off many of its younger engineers and formed a crack team of process control specialists to replace them. The team was called “The C Team.” This is their story.

The team's leader was an imposing figure, a man of few words but who always projected an image of confidence. His code name: Vulture. The first day the team was formed, Vulture requested a meeting of his newly created platoon, listed here in order of seniority:

- G. K. Mason. Code Name: “The Neutralizer.” Expertise: World-renowned leader in pH control.
- T. L. Tracy. Code Name: “Reflux Man.” Expertise: Distillation column control.
- L. D. Ericsson. Code Name: “Virtual Reality.” Expertise: Dynamic simulation of chemical processes.
- R. J. Kalbert. Code Name: “The Code Junkie.” Expertise: All distributed control systems (DCSs), dynamic matrix control, and neural networks.


I PITY THE FOOL WHO MESSED UP MY CONTROL SCHEME!
SECURITY
Please bang bell with a hammer, real hard...
ZZZZZZZZZ....
MAGIC CAUSTIC DOSE
RESTROOM-SAUNA
?
T.Williams

From The Control Room…

"The tank got up to 68 percent centigrade."

— B.F.

"It doesn't matter who runs the board. Everybody's qualified."

— Cliff

"I don't argue with anyone anymore. Including my wife and kids."

— Bill

Vulture explained to the group that its mission was to search out and correct control deficiencies throughout the company. With that the C Team started its quest. Meanwhile, M. D. Evil, one of the young laid-off engineers teetering on the edge of sanity, learned of the C Team and went over the edge in a jealous range. Following in the footsteps of many postal employees before him, he decided to make Chem-O-Inc pay for its lack of compassion. That night he dialed into a DCS at one of the Chem-O-Inc sites and uploaded a deadly program. Just as he finished uploading, Chem-O-Inc learned of the security breach and notified the C team and company management.

When company management learned of the problem, they brought in Austin Powers, international man of mystery. He showed up and asked, "What's the problem, baby?" The operators just gave him a strange look and filed a grievance for sexual harassment. At the same time, the C Team quickly mobilized and started in on the problem. The Code Junkie quickly changed all the passwords to prevent further security problems, and the other three started to examine current process data. They quickly realized that there was a problem in the reactor: it was going supercritical.

The Neutralizer had an idea, if he could just add a third feed stream to the reactor feed, he could slowly bring the reaction under control. He would need to be careful. If he added too much of the new chemical, he could aggravate the situation. But he would need to test his theory. Virtual Reality and Reflux Man quickly developed a crude but accurate dynamic simulation while the Neutralizer and the Code Junkie reprogrammed the DCS. Within minutes, the

code was downloaded on the simulator and the kinks worked out. With the changes verified, the production system was updated and the reactor quickly brought under control. The C Team had saved the day.

Austin Powers was fired by Chem-O-Inc and landed a job with the Clinton administration as director of interns. The C Team was promoted and given a license to control by the U.S. Secret Service. It seems that in certain situations a super engineer can be more valuable than a super agent.

— Chris Toarmina

From The Control Room…

"I need to take a picture of her because I can't remember what she looks like."

— Lanny, talking about his girlfriend

"I'm a deer hunter, but I can't shoot them."

— Lanny

"I'm going to download you on your head, big boy."

— Roy, to Moondog

12

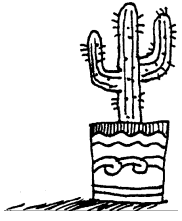
Top Ten Neat Things To Do in a Big Corporation

10. Obtain your CEO's favorite book. Read passages backward to look for hidden meanings. Add illustrations.

9. Hug your boss after your next performance review. Plead for an encore and autographed paycheck. Name your children after him or her even if it's the wrong sex. Heck, I have a daughter named Arnold.

8. Develop maze games to liven up your otherwise dreary generic cubicle existence. Place summer employees in the center and see how many days it takes them to find the exit. Make them wear numbers, and place bets on who wins. Place doughnut piles and coffee pots in strategic spots to stave off starvation and dehydration.

7. Play Russian roulette with the food machines that replaced your cafeteria. Use blindfolds, nose pins, and hot sauce to prevent sensory-induced illness. Give a prize for highest cholesterol test result.
6. Collect swell gifts from the stockholder meetings. Give them as presents to your friends. Look for new friends.
5. Create a new department and post the announcement on the bulletin board. Restructure it yearly. Promote your friends. See how long it takes for someone to realize it has no purpose.



4. Watch the number of slabs of granite and colored glass go up as the number of engineers goes down. Donate one in the memory of an ex-engineer. Look for one with your name on it.
3. Watch the number of vice presidents go up as the number of engineers goes down. Add them to your Christmas list. Drop in for coffee and chitchat.

From The Control Room…

"I was offered $5,000 but I'll take $4,000."

— Bill, talking about his van

"Popeye stays strong by eating sauerkraut!"

— Marv

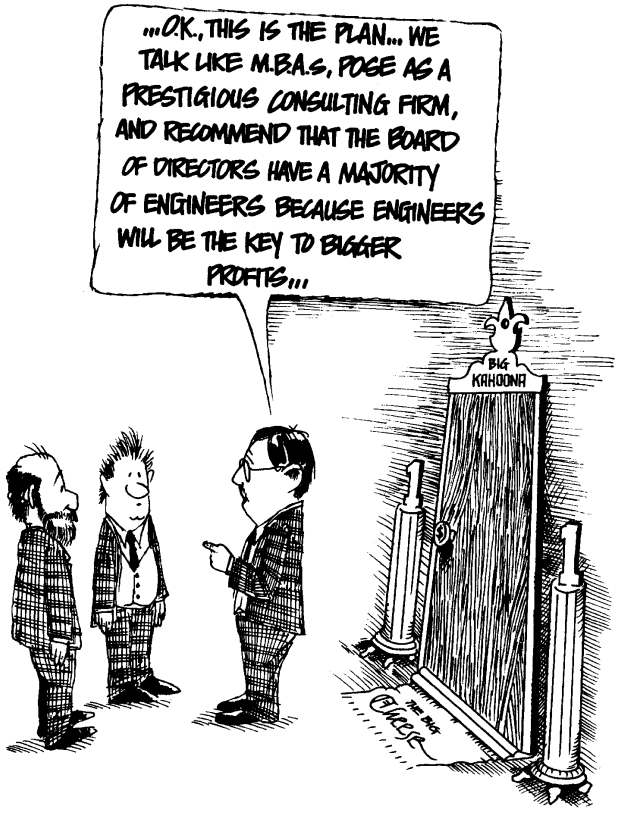
From The Control Room…

Jeff: *"Are you sleepy?"*
Marv: *"No, I'm just tired."*

"Will hot steam cut formaldehyde?"
— Bill

2. Watch the number of site administration employees go up as the number of engineers goes down. Make sure there are international symbols for staircases, coatrooms, and meeting rooms so foreign visitors don't relieve themselves in the staircases or try to have meetings in a coatroom.

1. Watch the number of management courses go up as the level of technical courses goes down.


...O.K., THIS IS THE PLAN... WE TALK LIKE M.B.A.S, POSE AS A PRESTIGIOUS CONSULTING FIRM, AND RECOMMEND THAT THE BOARD OF DIRECTORS HAVE A MAJORITY OF ENGINEERS BECAUSE ENGINEERS WILL BE THE KEY TO BIGGER PROFITS...
BIG KAHOONA
THE BIG @#%$!R

13

Instrument Manuals Part I, The Books

You would think that after someone had worked their way up from swing set assembly instructions through computer software documentation to the ultimate test—the VCR setup and programming book—they would have seen and done it all. What challenge could daunt such a person? Are you like that? If you have learned to reset your car radio clock all by yourself, you may feel that you have nothing else to prove. Wrong! There exists a body of prose even more inscrutable, convoluted, and unusable than any of the above: the ubiquitous Instrument Manual.

With each instrument you buy, manufacturers graciously give you one manual. (If, that is, they remember to include it in the box with the hardware. When you unpack your new handy-dandy pressure transmitter/can opener and don't find the documentation, it is almost impossible to get the manual you expected.) If you want more than one, they will provide duplicates. For a small fee.

Each manufacturer has its own system of documentation, but for the sake of simplification, we will define several types:

The Owner's Manual

This is usually a sales brochure with a line about how you plug the unit in and turn it on. It generally has a very clear, concise section explaining the model number, presumably to facilitate you in ordering more units. Even here, there may be the cryptic "x" at the end of the model number, meaning it is a special that only one person can identify. He is usually on vacation.

The Installation Manual

This shows how to physically install every unit ever made, being made, or about to be made. Sometimes you can tell which one is yours but often you cannot. There are generally enough wire tables and information on conduit runs or cable trays that you have to look at the front cover again to be sure you did not pick up an NEC accidentally. You might even find a diagram showing how to wire the unit you have purchased.

The User Manual

This generally starts with a picture of the front and back of the unit, with all those neat little numbers in the circles, followed by text naming each of the numbered items and briefly explaining their functions. This is followed by a detailed description of each function, including (but not necessarily

From The Control Room…

Jeff: *"How old are your kids?"*

Brian: *"They're nine and ten. Heather will be twelve in January."*

"He spoke five languages frequently."

— Dan

From The Control Room…

Brian: "What do you use to rod-out Finisher III?"

Rick and Jay: "A rod."

"The best-laid plans often go cockeyed."

— Marv

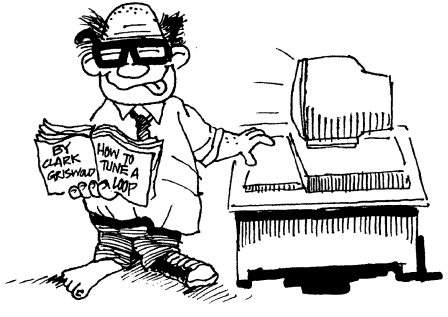
corresponding to) the numbers in the previous section. The next section is usually a troubleshooting guide. Since only items that never correspond to your problems are included in this section, it is best left alone.

The Communications Guide

If you have purchased a unit with a microprocessor, this may also be included. It includes many pages of fishbone charts, showing all the flows and menu levels for the available communication devices. It also shows you how to configure your unit and enter all the pertinent data and information. Usually, a section on error codes is included and sometimes the meaning of the codes themselves. Of course, the charts and error codes are not the same for the handheld communication device as for the keypad built into the unit. I am not sure why this should be so, but it usually is.

And we're just getting started. We will elaborate on "The Rules," after a short intermission.

— Leo Lang


BY
CLARK
GRISWOLD
HOW TO
TUNE A
LOOP

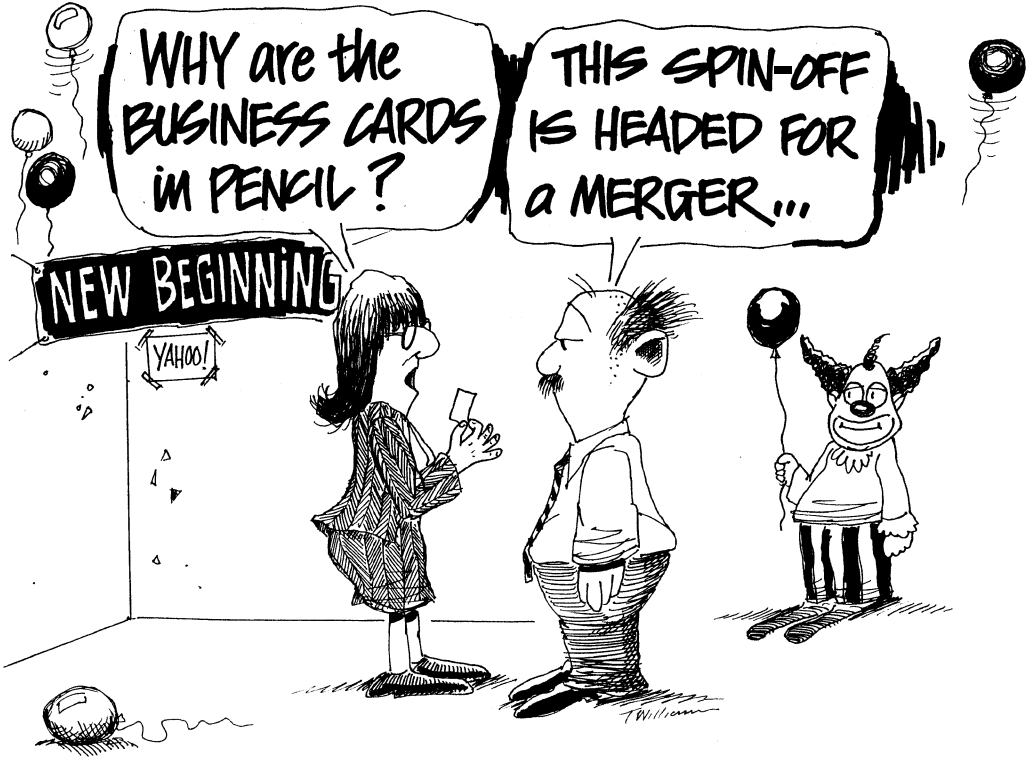
14

Top Ten Books We Really Need

Instead of another book on control theory, or another manual, what we need are books that will really help our careers. We think the promotion to Super Engineer may be just one book away from us. If only we could find the right one.

Here are some titles we are looking for:

10. *Taking the Capital out of Capitalism*
9. *Impressive Graphics for Average Results*
8. *How to Win at Phone Tag*
7. *Emerging Careers as a Meeting Specialist*
6. *Foolproof Goal Document Verbiage*
5. *Short Cuts to Early Retirement*
4. *Appearances "R" Everything*
3. *Can Computer Integrated Manufacturing Be Your Meal Ticket?*
2. *Creative Time Sheets*
1. *How to Impress MBAs*


WHY are the BUSINESS CARDS in PENCIL?
THIS SPIN-OFF IS HEADED FOR a MERGER...
NEW BEGINNING
YAHOO!
T.Williams

15

Instrument Manuals Part II, The Rules

If you read Chapter 13, "Instrument Manuals, Part I," you realized how difficult it is to figure out which manual you have when you get your new instrument. Once you have figured it out, you have to try to use it to your benefit. Exhaustive research has uncovered a list of ten commandments that manufacturers use to generate these manuals. At great personal risk, the creators of this book will print them here for use by the general public.

Rule the First — "Page numbers shall not be used." Instead, use the Obfuscational Ordinal Positioning System (OOPS!). This system, invented by the federal government, consists of complex numbers resembling polar coordinates. The first set of digits is the section number of the manual, and the second set is the paragraph number. Since the pages are numbered sequentially, the reference numbers are almost totally useless in helping you find anything in the manual.

Rule the Second — "Illustrations shall be numbered using a different system than text sections." The pretty pictures or illustrations have a numbering system that is similar to rectangular coordinates, but the first two

digits indicate the paragraph number, and the last two tell you where to find that picture in the section; but these are in numerical order.

Rule the Third — "The author of a manual must be unfamiliar with the unit the manual is about." He or she must have a somewhat limited vocabulary and no grammar skills. Lawyers may assist the author to make sure no statement is comprehensible enough to expose the company to legal action.

Rule the Fourth — "No illustration shall be on the same page as the text that applies to it." Having it in an entirely different book is desirable, but not required.

Rule the Fifth — "Having complied with the first four rules, a fifth shall be required." Preferably single malt.

Rule the Sixth — "All printing on wiring diagrams shall be so small it is unreadable." This applies particularly to values on electrical components and wire numbers. Smudging is an acceptable alternative, as long as the smudged material is illegible (this technique is, however, frowned on by some vendors as "bush league").

Rule the Seventh — "The manual shall be based on software, one (and only one) revision behind that version used at the time the unit was manufactured." This ensures that the examples and fishbone charts will be different than the user's, but only in subtle ways that are not always easy to spot.

From The Control Room…

"They needed one of those tarphoon guns to rescue the man on the ice floe."

— Marv

"It's gonna take a screamin' dive up, in a minute here."

— Lanny

From The Control Room…

"If I had said that to her, it would have been perogitory."

— Rick

"Did you see John Candy in 'Uncle Jake'?"

— Lanny

Rule the Eighth — "Every manual shall have a technical help line phone number concealed in it." Here, the vendor has two options. He may make it an 800 number, but if he does it can be manned by just one tech only on even-numbered Sundays, in odd-numbered leap years. The second option is a regular pay-per-minute long distance number. When you call it, you must tell your story to at least three people, who will then say you have reached the wrong person, but they will try and connect you to the right person. You will then be put on hold for at least ten minutes. Finally, (what else) you will hear a click and a dial tone and know you can now give up, or call again and start over.

Rule the Ninth — "Every manual shall include at least one, and no more than two, items that are not exactly true." For example, one recently encountered manual said in two places that the working pressure of gas supplied to the unit must not exceed 14 psig. When control engineers encountered a problem getting the proper flow rate, the vendor told them to crank the supply pressure up to 25 psig. When one protested, he was told that he had the new model, and it could take the additional pressure.

Rule the Tenth — "You shall pray that you get no feedback." Control engineers and technicians have been known to let vendors know what they think about their documentation. This can be disastrous, when the goal is to write bad, confusing documents. Responsible vendors, with good manuals, might appreciate the help and try to improve. Even bad ones might get better.

This should never happen! If no one squawks, a manual writer can assume he or she is doing a good job.

So, that's that. Now, as soon as we find a well-written manual, we are going to tell the vendor how much we enjoyed using it. If, that is, we can find the name and phone number in the manual.

— Leo Lang

From The Control Room…

"You know, it's like when two people are facing the same direction, and they meet each other."

— Gretchen

"Reverse exmosis."

— Jay

16

Believe it … or Don't (Part II)

Sometimes statements are made that just seem too radical to be true. Here is a collection of expressions from unknown sources. It is up to you to decide whether they are even remotely possible.

- A CEO's office wall has autographed photos of the top engineers.
- A business student switched to engineering because the business courses were tougher.
- An engineer was elected president of a chemical company. (Wait, that's too bizarre for even this book! How about, *An engineer was elected to the board of directors*. You don't buy that either? Would you believe, *An engineer was selected as a vice president*? Not conceivable? Try, *An engineer was promoted to a position that impacted the company's future*. No? Would you consider, *An engineer was once asked for advice from top management*? What, that's not possible? Well, OK. But several authorities claim a president once asked an engineer for directions to the rest room.)
- An MBA understood and appreciated the contribution of an engineer.


...OUR NEW RETIREMENT INCENTIVES ARE ASSIGNMENTS to BUILD REVOLUTIONARY PLANTS in NEW COUNTRIES!
EL CEMIKOLA de la DIABLO
WE ARE PURSUING the LOWEST BID for BODY GUARDS and WEAPONS!
?

From The Control Room…

"Did the microwave bite the bullet?"
— Alan

"He pulled out a knife. I thought he was going to shoot."
— Jeff

"… when she tried to kill himself."
— Rick

- An engineer understood and appreciated the contribution of an MBA.
- A company said, "We must increase our manufacturing base instead of selling assets to increase our return on capital."
- A company declared, "The heck with what Wall Street says, what we really need are plants designed to outperform the competition."
- Tokyo companies expressed concern about the low ratio of MBAs and lawyers to engineers in Japan.
- A company affirmed that employee career growth and self-fulfillment were more important than stock price growth, extra dividends, and stock bonuses for upper management.
- Russia's top officials pleaded with the U.S. president to send over surplus lawyers to help their struggling economy.

Believe it! … Or don't.

17

Get Smart

No, this isn't the old TV show starring Don Adams. We're referring to the increasing application of smart instruments to the process control environment. Since the technology was moving quickly as we wrote this in the late 1990s, we've put this chapter in the past tense. So maybe our book will be obsolete by the time you read this. Or maybe not.

Anyway, "smart" was a great new technology, and we were all for its use. The real advantage smart devices offered was communications. Instead of having only a 4–20 mA signal, they could communicate a lot of other data using a digital signal heterodyned on the current loop. This allowed enhanced control, more effective maintenance, and increased data acquisition capabilities. Contrary to popular assumptions, if an instrument was not "smart," that did not make it "dumb"; it made it "standard." There were, however, some watch-outs that you needed to know about using "smart" optimally.

First of all, smart communications may have a 4–20 mA current, but it must have a digital component too. If you were going to take the digital signals to a DCS or PLC, there was a significant cost incurred. For instance, in the late 1990s it could cost about $7,000 for the hardware to connect four inputs and eight outputs. This did not include installation cost, labor, software, or configuration and programming. On large projects at


THE REAL REASON OUR STOCK HAS GONE UP IS THE EXCELLENT JOB DONE BY ENGINEERS IN BUILDING, MAINTAINING AND OPERATING OUR PLANTS!
OOOOOO...
AAAAAAHHH...

From The Control Room…

"How would you like to be permanently dead?"
— Rick

"She was almost anaerobic."
— Don

"It's almost astrological."
— Hammond, talking about how much beer someone drinks

"My brother knows Tae Kwon Woo."
— Wilson

manufacturing plants, this sort of cost could probably be justified. If you did not use a DCS or PLC, you needed to make sure any device the field units connected to could talk the smart unit's language. For example, if a recorder was looking for a 4–20 mA signal and doing a square-root extraction internally, it did no good to send it a digital signal with the square-root extraction already made.

You then needed to purchase a communication device. The vendors offered either a software package that might include a special cable, a modem, or both; or they might offer a self-contained handheld communication device. The software packages with cable and/or modem typically ran as high as $1,500 each. The handheld units could cost as much as $2,500. Such devices were a must for setup or maintenance work. If you bought smart devices, you needed to have a way to talk to them.

Smart communications applications turned out to be an involved topic. The first thing you needed to know about was the protocol. Some companies (like Foxboro and ITT/Barton, to name a couple) had their own software protocols that were proprietary. If you wanted to buy one of these, you either had to buy that vendor's software or its handheld communication device. The other alternative was to inhibit the smart software, which defeated the whole point. Other vendors offered smart units that had proprietary protocols but also offered units that were "HART" compatible. In that case, you needed a Rosemount 275 with the vendor date definition languages (DDL's) installed or the vendor's handheld with the HART software option.

HART is the protocol developed by Rosemount in the 1970s. In a stroke of genius, they offered to give the protocol to anyone that wanted it. Many companies jumped at the opportunity to get something for nothing and took them up on the offer. As a result, HART accounted for probably 90 percent of the installed base by the end of the century. Honestly (and, boy, can this one get us in trouble), we have not seen any vast difference between the features and functions available among the different protocols.

If you bought a product from an Emerson company, a standard HART 275 handheld could talk to it. If you bought a HART compatible from another vendor like Fischer-Porter or Endress & Hauser, the standard HART device would perform only certain limited functions. For the full power of all the features, you had to get the Rosemount 275, modified with the vendor's DDLs. Let me tell you, those folks did not give these modifications away. They all would sell you a version of their own handheld that would talk to their units using HART, but they cost as much, or more, than the modified Rosemount. Rosemount would sell you a 275 with an eight-megabyte module in it that would talk to any HART-compatible device, but they weren't giving the modules away either.

Thorough familiarity with all the nuances of the system was a prerequisite before committing to buy. Even so, you had to be sure you knew what you were getting and that it was what you wanted and did what you needed done. If you were adding a small project or installing one or two loops at a site, you needed to look very hard at how cost-effective "smart" was

From The Control Room…

"It works by conviction."
— Marv, talking about the methanol column reboiler

"It was exactly the same, only opposite."
— Don, talking about race car paint jobs

"We'll do it on a base-by-base casis."
— Marv

"He's over there picking up that empty trailer."
— Purdy

From The Control Room…

"I don't argue, I just state facts."
— Don

"Put her on a deserted island with me, and she'd have a kid in six months."
— Joe

"… guaranteed to control the birth population."
— Woody

"I'm at my rope's end."
— Lanny

compared to the standard application units. It meant added hardware costs and a learning curve associated with installing smart technology for the first time. It wasn't always worth it for everybody. Those decisions had to be made individually and required that you do some real research so you could make an informed purchase. If you hired someone to do your design and engineering, he or she needed to know about this stuff, after which he or she could wade through the swamp for you.

And maybe that was the smartest way of all of getting smart.

— Leo Lang

18

You Might Just Be a Process Control Engineer if …

You might just be a process control engineer if …

- Your first and second language is for a DCS.
- You have photos of pH electrodes in your wallet.
- You take a laptop to church.
- You take a laptop to bars.
- Your riding lawn mower has a laptop holder.
- Your laptop has a beer-cup holder.
- You have more muscles in your fingers than in the rest of your body.
- You have X-rated pictures of people doing strange things with obsolete DCS consoles.
- In your dreams, “Baywatch” lifeguards wear hard hats and carry laptops.

From The Control Room…

"I lost fifteen pounds this morning."
— Marv

"Nobody in this plant wants to work a forty-two-hour swing. It's a factor of life."
— Bruce

"Precipitating saw."
— Marv

- You name your children "Lightning" and "Thunder" after DCS releases.
- You are frustrated with your inability to determine the root causes of noise band and dead time in your peer 360-degree feedback.
- You have added so much feedforward to your schedule, you now eat prior to getting hungry.
- You have hired a private investigator to determine who gave your life to Dilbert.
- The joke about drinking and driving on the information highway has you worried.
- Your company has used a P-versus-T algorithm to calculate your salary (pay versus travel, i.e., no travel = no pay).
- You did an opportunity assessment on your life and came out with 999 action items, all priority one.
- You consider the title "Bithead" to be a compliment.
- You've become worried that coffee breaks are adding too much dead time to the bottom line.

- You stay awake at night puzzling how to better control the pH concentration in your hair.
- Your wife asks you to reset the clock, and you can't remember if the small hand is minutes or repeats per minute.
- You try to follow along during the scripture readings at church, but you can't find any reference to Revelations in the *FST Pocketbook*. (But, hey, you did find a reference to Numbers … The pocket book must stop with the Old Testament.)

From The Control Room…

"The radio was kind of gargled."
— Cliff

"From sunup to sunrise."
— Cole

"I've got a couple of solar lights, but they run on electricity."
— Ginger

19

How to Succeed

When he was much younger, your author used to wonder how you could get rich working if you did not have your own business. The way to succeed as an employee has since become clear—it only took him forty years of working for others to figure it out. No roof has to fall on him, boy!

The way to get ahead is really quite simple. There are a few basic concepts to follow, which are here enumerated:

1. Have a common first name.

2. Know enough, but not too much.

3. Talk about the right hobbies.

4. Look good, but not too good.

If you follow these guidelines, you can become independently wealthy, like Larry S——, for instance. These ideas are presented so you can succeed at a much earlier age than those of us who had to learn them by trial and error. Thanks are not necessary; however, any donations to the Leo Lang Retirement Fund would be gratefully accepted.


...WHAT'S WITH the DISGUISE?
SAY THE SECRET WORD, and I WIN A TRIP to SOUTH AMERICA!
PLANT MANAGER
SPILL
CUP A JOE
T.Williams

From The Control Room…

"You mean UFOs?"
— Jay, when asked where service techs could go for coffee and donuts.

"I didn't know that Cole left the country."
— Don, after he was informed that Cole was vacationing in Florida

"Could you check the vapporizer?"
— Purdy

Have a common first name. Remember, you do not want to be memorable. At PC&E, for instance, there are three Debbies, three Ricks, two Rons, and three Jims, Nancys, and Bobs, all on the road to great wealth because of their names. They have a leg up on people named Monica, Stephanie, or Leo. Rule Number 89 of Damnology is that a boss will always remember the bad things you do but never the good stuff. The boss will *sometimes* notice you when you do good things, but he or she will not remember very long unless you frequently remind him or her. However, the boss will *always* notice you when you mess up and will never forget. Rule Number 16 of Damnology is that one "Aw, shoot" erases any number of "Attaboys." If you have a more common name, he or she will still remember that Joe did something bad, but he will forget which Joe—leaving you off the hook.

Know enough, but not too much. This may seem obvious, but bear with us. We only mention it for completeness and to clarify it for the few poor souls who have not caught on yet. You have to know *something* about your job. If you don't, the boss will eventually catch on, no matter what your name. On the other hand, many employees do not realize that you can know too much. This can put a crimp in things, big time. For instance, say you are like Chris G—, the answer guy for all computer questions. He will never make it. People who know too much get put on committees. Then they become "Recognized Authorities," which means they are busy working all the time and do not have time to remind the chief of the good things they've done. Conversely, when the boss is trying to remember who wrote the code that caused the infinite loop in

the last software package, Recognized Authorities cannot be at his or her side helping him or her to forget that it was them.

(Think about people known for being great, such as Mother Teresa, Albert Schweitzer, or Steve H——. They are world renowned for their great achievements! Did any of them have any significant amount of money? Jane Goodall will go down in history for her vast knowledge and dedication to the study of chimpanzee behavior, but she'll probably die broke. Albert Einstein will never be forgotten, but the government had to finance his funeral. It just does not pay to know too much!)

Talk about the right hobbies. Notice that we do not advocate *having* the right hobbies, only talking about them. (It does not matter what you do for a hobby, as long as you do not get arrested for doing it.) The four pastimes on the "must list" are *watching sports, hunting and fishing, looking at members of the opposite sex*, and *viewing movies or television shows.* If you talk about any or all of these topics for three or four hours a day, you can be sure you will succeed on the job. It helps even more if you spend a good portion of this time actually talking to the boss about these subjects. Everyone else who talks to him is either reminding him about the good things they did, not reminding him of the bad stuff, or asking for a raise.

(Proof, you say? Ed H——, a man of untold wealth, can always be heard conversing about hunting and fishing, hobbies on the high-profile list. Go hunting or fishing with him sometime, and you will find he likes to quietly discuss ethical philosophy or collect antiques for his farm. He is smart

From The Control Room…

"One week he didn't talk to me for three weeks."

— Rick

"When I went to school the speed of sound wasn't that fast."

— Don

"He took forty-five minutes to go a half hour."

— Fridley

From The Control Room…

"Is that Iron Zeppelin? Is that what they call heavy acid music?"

— Roy

"They got three dices."

— Marv

"That thing could be one-sixteenth or one-eighteenth off. That makes a big difference."

— Marv

enough not to talk about these things at work, or people would not buy from him. More proof, you say! Bob M—— is stone broke, poor guy. He is almost as good looking as your author, knows some stuff about his job, and has a good common name. But he will never be rich because he talks about gardening and El Caminos.)

Look good, but not too good. This is a hard concept to pin down. It is not the same as being good looking. I recently met a copier salesman who is, in the words of the PC&E office manager, A Stud Muffin. This certainly helps him sell copiers and copier services. It will not, unfortunately, help him get ahead at his place of employment. Now consider your author. Those who know him may have noticed his hair is not always combed perfectly, nor does his attire reflect the latest styles. He does this intentionally to ensure that he does not slip over the line into the Stud Muffin category. (Incidentally, though people have different tastes regarding what makes a member of the opposite sex attractive and may dispute the looks of ordinary mortals, once a person achieves Stud Muffin status there can be no disagreement. Everyone just knows. The same concepts apply on the rare occasions that men look at, or talk about, women-—only the nomenclature changes.)

Readers, your author offers these guidelines out of pure good-heartedness and hopes you all succeed in getting wealthy. Remember: If some money is good, more is better. You cannot get too much of a good thing, and money can be a very good thing, particularly if it is yours. As the great philosopher Ann

Landers said, "It is easier to cope with your problems if you have money than if you are broke."

P.S. Because of the continuous urging of the big boss, your author is constantly striving to increase his money supply. As he cannot improve on his looks without becoming a Stud Muffin, cannot get any better at his job without becoming a Recognized Authority, and already talks about the proper hobbies for at least four to six hours a day, the only remaining improvement is a more common name. He has been giving this a lot of thought. Debbie might be nice.

— Leo Lang

From The Control Room…

"The water is two steps down from the top of the Arch."

— Brian, about the Gateway Arch in St. Louis

"I heard he had a SCAT scan."

— Dick

"Don't crowd your luck."

— Marv

"Codobras."

— Rick, asked about another name for dead bodies

20

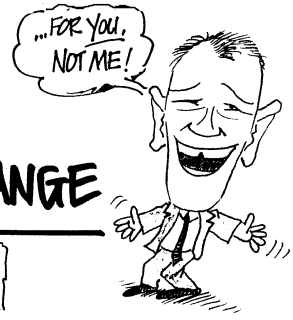
More Top Tens

Top Ten Reasons to Suspect an Impending Career Change

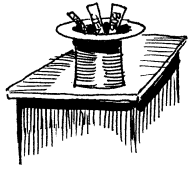
Since top management has gotten more creative in finding ways to eliminate people, we need to become more innovative in recognizing imminent employment transitions.

10. You are asked to wear a price tag on your back when Germans tour your plant.
9. Bob and Bob use the word *sucks* ten times in describing your plant.
8. It's getting close to stock bonus time.
7. Plant management meets at an undisclosed location and never returns.
6. The head janitor is seen in conference with Bob and Bob.
5. When you try to use your log on ID, the computer asks “Are you kidding?”
4. When you try to use your company credit card, it is listed as stolen.

TOP 10 Reasons to suspect a CAREER CHANGE



OFFICE NAMEPLATES DISAPPEAR into a HAT...



YOUR SECRETARY ASKS "WHAT ARE YOU DOING HERE?"

WHEN YOU TRY TO USE YOUR LOG ON ID, THE COMPUTER ASKS, "ARE YOU KIDDING?"

A STRANGER is SITTING AT YOUR DESK...

WHEN YOU TRY TO USE YOUR COMPANY CREDIT CARD, IT IS LISTED as STOLEN...

From The Control Room…

"Do albatross birds come from Alcatraz Island? I know that's probably a dumb question."
— Rick

"Did they show them with infraray camera?"
— Marv

"… No, not right off the top of my hand."
— Hammond

"He was a ladies' woman."
— Purdy

3. A stranger is sitting at your desk.
2. Your secretary asks, "What are you doing here?"
1. Office nameplates disappear into a hat.

Top Ten Reasons for Selling the Plastics Business

10. Pocket protector sales plummet because of the massive retirement of engineers.
9. Your company needs money to buy more tomatoes.
8. Your company needs money to buy more wooden vats.
7. Marge Schott closes a deal with P&G to use Pampers instead of Acrylonitrile Butadiene Styrene (ABS) for batting helmets.
6. The aptly named Fieros have a nasty habit of catching on fire and melting.
5. Plastic cows are not a big seller.
4. ABS injected into cows doesn't make them produce more milk.
3. ABS added to salad dressings makes them chewy instead of thick.
2. ABS sprayed on plants doesn't kill them.
1. The company can unload its Bengals tickets.

Top Ten Reasons to Go to College

10. It's the world's largest party.
9. Sleeping till noon.
8. Your parents practically pay you to party.
7. "D" is for diploma.
6. Real world: "Go to work and get fired."
5. College world: "Skip class and watch Beavis."
4. Beer.
3. Where else is fifteen hours considered a full week.
2. Weekends start on Thursday.
1. Two words: "road trip."

From The Control Room…

"It's going to rain all night for a week."
— Marv

"My electrical service is zilk."
— Marv

"T-salt weighs two cents something a pound."
— Jay

"… like a rooster in heat."
— Lanny

"I've looked through his glasses, and they aren't that extorted."
— Bill

21

Is Anyone There?

Has anyone else noticed that almost no one ever answers the phone any more? We have more ways to communicate than ever before in history. We have e-mail, voice mail, pagers, digital phone systems, cellular phones, message machines, fax machines, "AOL Instant Messenger," and ICQ. You can communicate until your jaw falls off as long as you do not expect to talk to a real, live person.

The most common form of automated "brush-off" is voice mail. The person you are calling will leave a message for you to leave a message for them. This is the downsized version of having a receptionist screen incoming calls. If you are privileged to know how to dial in direct to the desk of the person you want to talk to, you generally go the route of the personalized message. All a message really needs to say is "Leave a message for me at the tone." But it usually starts out telling you the following:

"You have reached Suzy Soaks. I am on the phone or away from my desk. Please leave your name, phone number, and a brief message, and I will call you back as soon as possible."

Let's stop and look at this modern standard. First, obviously, you have not reached Suzy; you have reached her voice mail. If you had reached Suzy, you would now be talking to her, not listening to a recording. (A variation of this is to say that you have reached the desk of Suzy, which is even sillier.) Second,

the interval allowed for a message is generally timed so you can blurt out your name, number, and everything except the part that counts: "This is Leo Lang at 555-3132, and since the world is coming to an end tomorrow, I suggest … BLEEP!"

Finally, everyone knows that Suzy will not call back unless she needs something from you or is your wife or mother. And even then the chances are slim. You could grow old and die listening to most company greetings. The voice mail system will start out with an interminable list: "Enter the extension for the party you wish to speak to [you never call a person, always a "party"—-some people lead a good life]. Press '1' for the company phone book; press '2' to spell the name of the party you wish to speak to; press '3' to send a fax; press '4' for further options" (which must be things like ordering pizza or talking to the stress hot line). Since most of us have lost interest by this time, we never find out what the "further" options are. The last choice is always "or stay on the line to speak to an operator." If you try for the operator, after a preset time you hear a click followed by a dial tone, denoting the need to start over.

A pernicious variation of the phone tag-torture system is the automatic rollover. Once, a local vendor gave me the name and number of a factory representative in Chicago who had information about a problem with a vacuum switch. After two days of phone tag, the man actually came to the phone and promised to make arrangements to get the switch sent back and checked out. "But if you don't follow my instructions exactly, the repair will

From The Control Room…

"Hey, they didn't bring in a drum full of orange-topped trailers did they?"

— Purdy, talking to the guard

"I thought they'd get beat by the fifty-run rule."

— Brian, talking about football

"Well, it's the ones with the green nuts on 'em."

— Don, asked which size wrenches were needed

"He's three bubbles off."

— Woody

From The Control Room…

"Traffic in Taiwan is wall to wall."
— Rick

"I want something different but the same."
— Stephanie

"Damp water."
— Bill

"Hey, what color is Rudolph the Reindeer's nose, anyway?"
— Rick

take a long time," he said. "Or the switch might get lost entirely. First, you need to call the phone number I'm going to give you for a return authorization number."

That's when the trouble began. Maybe your author miscopied the number, or the rep misstated it, but the number turned out to belong to a fax machine. Faxing the request only produced a return fax saying that the number was the fax number of a church, and they did not repair vacuum switches. After I faxed an apology and a request for prayers, the obvious next step was to call back to the factory rep in Chicago.

In the interim, an automatic rollover system had been activated at his office. When he did not answer, instead of switching to his voice mail the phone rolled over to the home office of the company in Massachusetts. The lady there was very nice but insisted that all repairs had to go through Houston, Texas. She forwarded the call to the Houston office, where a recorded menu of options offered itself: "Press '1' for domestic accounts; press '2' for export accounts; press '3' for literature; press '4' for technical sales; press '5' for a prayer, or stay on the line for an operator." Naturally, none of first four options was helpful and prayers were already in the works, so the operator seemed like the best bet. She was very nice and put the repair department on the line. They said it was fine to send the switch to them but that without a return authorization number it was risky. That had to be provided through the sales representative in Chicago.

At this point, the only option was to scream, say another prayer, and turn the whole mess over to someone else.

Obviously, all the new technology and systems associated with phones and communications has been instituted because no one wants to listen anymore. The "powers that be" just do not want us to know it. Lucky for you, dear readers, your author discovered this and let you in on the secret, or you would have been wasting time and phone calls trying to actually talk with people.

Of course, there is still the prayer option. Just press "5."

— Leo Lang

From The Control Room…

"She's suckin' like a racehorse."
— Wayne, on a vacuum problem

"The dog was stunted at growth."
— Sonny

"What part of the chicken does chicken-fried steak come from?"
— Brian

22

More List Insanity

Top Ten Things We'd Rather Do Than Use a Block Valve for a Control Valve

10. Have open heart surgery.
9. Have a root canal.
8. Go on a date with Roseanne Barr to a karaoke bar.
7. Conduct an opportunity assessment in Baghdad.
6. Get 360-degree feedback from Charles Manson.
5. Go to dinner at Jeffrey Dahmer's.
4. Spend a weekend at the Nitro Discomfort Inn.
3. Watch reruns of the O.J. Simpson Trial.
2. Do lunch with Bob and Bob.
1. Go job hunting in East St. Louis.

Top Ten Signs of a Rough pH Start-Up

10. Food is burning in the operators' kitchen.
9. The only loop mode that is configured is manual.


IT HAS INCREDIBLY TIGHT SHUTOFF AND IS AS SOLID AS A ROCK!
IT EVEN HAS A SMART POSITIONER!
Real SMART
I WONDER WHY FRED SAID HE HAD a BIG DATE at a KARAOKE BAR?
The ULTIMATE BLOCK HEAD VALVE
TWilliams

From The Control Room…

"It would be interesting to see San Francisco play the 49ers."

— Dan

"Some kind of dog: a cougar, panther, or a leopard."

— Joe

Wayne: "I'm sure glad they don't do that burning thing any more."

Joe: "What 'burning' thing?"

Wayne: "You know, where they trash you?

Joe: "You mean 'roast' you?"

Wayne: "Yeah, that's it. I was close."

8. An operator puts his fist through the screen.
7. You trip over a pile of used pH electrodes.
6. The technicians ask, "What is a positioner?"
5. The technicians stick electrodes up your nose.
4. The environmental engineer is wearing a mask.
3. The plant manager leaves the country.
2. Lawyers pull the plugs on the consoles.
1. Bob and Bob are on the phone holding for you.

Top Ten Uses for Old Performance Reviews

Now that we have officially found out that results reviews have no effect on our raises or promotions (something we had suspected all along) and that, from a lawyer's view, it would better if they didn't exist, we have creatively explored other uses for our files.

10. Fire starters. For those fun times next to the fireplace or barbecue reading pep stories—heck, you can throw in the pep stuff too.
9. Insulation for your attic. The more paperwork you generated, the more energy you save—go for an R50 factor.
8. Christmas cards for your boss. Staple the X-ratings to your raise notices.

7. Landscaping for gerbils. Now *they* know how to have fun with paper.
6. Gourmet delight for vegetarians. Great fiber and an appropriate end.
5. Puppy training papers. Give a performance review on the puppy's ability to hit your performance review.
4. Office decorations. Highlight the really imaginative phrases.
3. Targets for skeet. Wad them up with glue and water and launch them.
2. Science fiction. Title it *Engineers from Other Worlds*.
1. Party hats for the next stockholder meeting.

From The Control Room…

"I don't watch those rock-and-roll bullshippers, anyway."
— Wayne

"I might just sit in the family room and watch the grass grow."
— Woody, talking about going on vacation

"There is moisture in the water."
— Wayne

23

Some Facts of Life (Or, Leo's Song of Innocence and Experience)

Innocence. If I am having trouble with a new device, I can call the salesperson and get it corrected free!

Experience. Two problems. First, salespeople make their money selling products and services, not doing maintenance or project work. Second, while they are generally knowledgeable, friendly, helpful, clean, and reverent folks, they are not in the design or repair end of the business for a reason. They prefer to sell rather than engineer.

Innocence. If a device is still in warranty, I can send it back and get it fixed for nothing!

Experience. You send it in after your maintenance folks or hired gun tells you it is not working. You will receive it back with a kindly letter saying it has been tested completely and nothing could be found wrong with it. Install it, and it will work like a champ. What are the possibilities? One is your folks could have been wrong. This happens but not as often as you might think. If you run a tight ship, it will not happen very often at all. The second is that


OUR STOCK OPTIONS DEPEND UPON THESE DISPLAYS!
...CAN WE MAKE the VESSEL SMALLER to MAKE THE RETURN ON CAPITAL LOOK BIGGER?
?
TAP TAP TAP...

From The Control Room…

"We caught a dead mouse over at Building 206."

— Wayne

"It's all steamed shut."

— Dennis, talking about formalin bleed valve

"Hey John, I heard Catholics like sex better than prostitutes."

— Brian

magic has occurred, and it's healed itself. This happens on occasions but not very often. The third is that the manufacturer found a flaw and repaired it. Keep in mind that the manufacturer has nothing to gain if he finds something wrong with your instrument. What does he benefit by saying that is what happened? At best, you will think that he is an ethical fellow with poor quality control at his factory, and next time you might look at other widget vendors who just may make a better product. His company has to pay for the repair, under any circumstances, since it is still under warranty. If they say they found nothing wrong, they preserve their reputation for good quality products, albeit at the expense of the local repair people. A further twist on this is that if they charge you for shipping and examination cost, they recover some of the expense of repairing their own screwup.

Innocence. If I get the factory technician in to repair my gizmo, it will get fixed right and cost me nothing since it is still under warranty!

Experience. Keep in mind that the factory technician's first job when he or she walks into your place is to find something you did wrong so his or her trip becomes a service call and not a warranty repair. The manufacturer views factory repair service as a "profit center." If all of a technician's trips turn out to be warranty jobs, he or she will be retrained or downsized in a hurry. You can bet that if an old hand walks into your plant, he or she will get the problem repaired, but it will turn out to be your fault. The unit was installed improperly or was misapplied. Listen to me (even though I am not Brown or

Cruppen)! If you go this route in most cases it will cost you more than having your own people do the job.

Innocence. Lump-sum projects are safer than time-and-material projects because I know the whole cost up front!

Experience. This one can be true in some instances. If you have done the planning and design work well, yes. If you have scoped the project properly and have a good process group with complete documentation, yes. If not, you're in trouble on costs. All contractors for their own protection include some fat in a lump-sum bid to cover unexpected difficulties. All contractors include for their own protection provisions for added work. Take a look at your most recent projects, and see how many change orders you had when it was finished. If you had more than a couple or they represented more than a small percentage of the total cost, you probably would have done better to go time and materials. Most companies today have downsized to the point where they cannot do project work as thoroughly as they would like to, nor do they allow adequate time for planning and construction. They feel that start-up time is added expense, and bugs can be ironed out on the fly. From what I have seen, these are phony baloney, but the accountants will not accept anything except "hard numbers." The only way to prove the point is to do one project both ways and see which comes out the best. Do you know what "fat chance" means?

Innocence. If you always use tried and true products and technology, you can't go wrong!

From The Control Room…

"From out here it smells like burning rubber, but when you go in there, it smells exactly the same."
— Dub

"Looks like I got myself into a big bag of worms."
— Sonny

"I went to the store, and they were all out of Napoleon ice cream."
— Ron

"Wayne, where do we keep the formalin storage tank?"
— Kevin

From The Control Room…

"Zip is remembering to make sure you guys don't forget."

— Kevin

"Did you know that you can drown a fly and then roll him in salt and he will fly away?"

— Don

"He looks like he's getting older every year."

— Brad

"You can always tell when someone is dead. Just look in their eyes, and that spark is missing."

— Don

Experience. I'll concede that gear that has been used in a given application previously will probably work again. But in many cases you'll be doing your company or client a disservice. New techniques often will be more effective, accurate, or versatile than older ones. Someone has to be the first kid on the block to try new things, which is why businesspeople employ engineers and technical people in the first place. They have money and want an efficient, cost-effective manufacturing plant. If they give you the money to design and build a plant for them, they will be angry when you build them a plant that produces "Rube Goldbergs" for ten bucks apiece, if the guy down the block makes them for five dollars each. In addition, many of the newer devices are cheaper and more durable than the older ones. If the guy down the block not only makes his product cheaper but builds his plant at a lower cost, you will catch it with both barrels from the guy paying your wages, and rightly so.

The bottom line is that the way business is done today can hurt *your* bottom line. Profits are the primary consideration, as always, and what a businessperson understands is hard numbers, not philosophical concepts. Ideas like planning, cost effectiveness, better applications, experience, and increased efficiency are hard sells. I guess technical people need to learn to sell their ideas better than in the past.

Maybe they should talk to the salespeople.

— Leo Lang

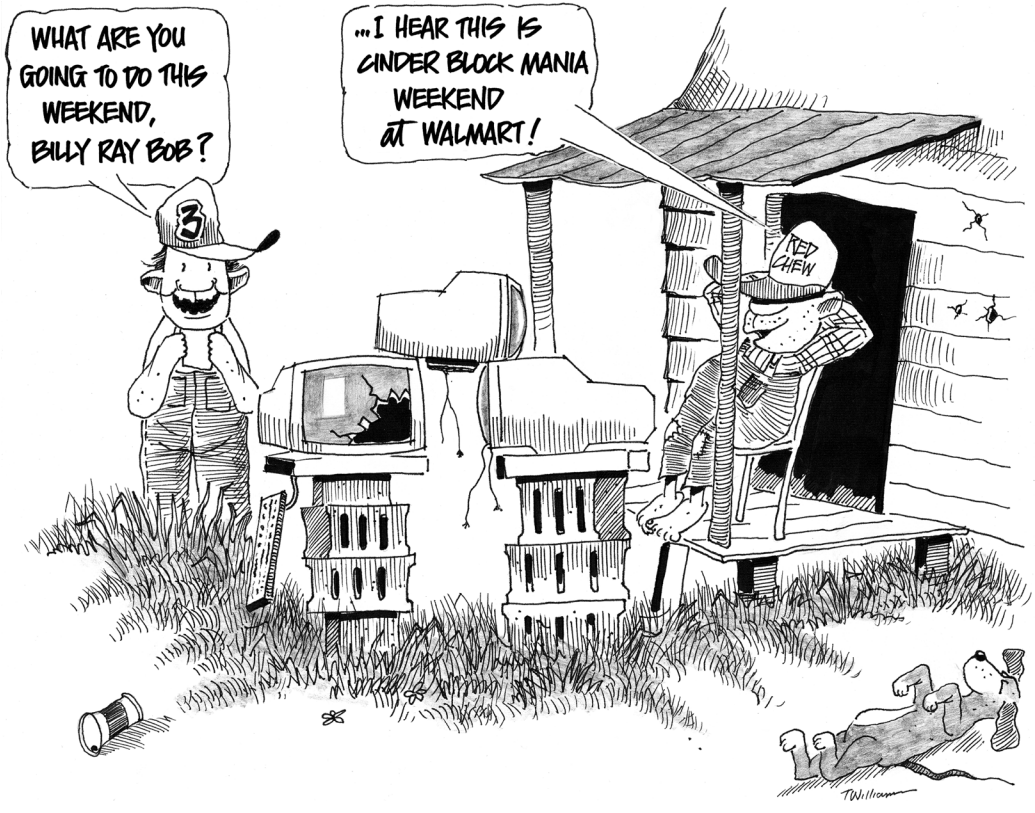

I GO TO SO MANY MEETINGS, I DON'T HAVE TIME TO DO THE DETAILED WORK WE WORRY ABOUT IN THESE MEETINGS...
WE BETTER HAVE A MEETING TO DISCUSS THIS...
HEY! MEETING!
BIG MEETING
Meeting

24

Top Ten Lists from Control Rooms Everywhere

Gerald's Top Ten Signs You Are Dealing with a High-tech Alabama Redneck

10. E-mail address ends in ".over.yonder.com".
9. Laptop has a sticker saying "Protected by Smith and Wesson."
8. Value of truck doubles after installing cellular phone.
7. Baseball cap reads "DEC" instead of "CAT."
6. Computer is worth more than all four cars combined.
5. CD-ROM used as a coaster for beer can.
4. Screen saver is a bitmap image of his favorite truck, tractor, or farm animal.
3. Wife says, "Either that computer goes or I go!"
2. That computer's really something, ain't it?
1. 486s sitting on cinder blocks in yard.


WHAT ARE YOU GOING TO DO THIS WEEKEND, BILLY RAY BOB?
...I HEAR THIS IS CINDER BLOCK MANIA WEEKEND at WALMART!
3
RED CHEW
TWilliams

From The Control Room…

"That's the reason I got that twenty-four-inch step ladder."
— Joe

"I saw air going into the AZO storage tank."
— Tim

"What was that woman's fame to claim?"
— Hambone

Soundar's Top Ten Reasons to Pursue a Career in Modeling

10. Six years in graduate school didn't prepare you for anything better.
9. You were pictured on the cover of *Chemical Engineering Progress.*
8. You thought working with models was a good way to meet people.
7. Citing latest buzzwords and jargon is your idea of having a good time.
6. Your number one goal is to be in the *Sports Illustrated* swimsuit issue.
5. You always get to make a presentation when the Top Boss visits.
4. Justifying boondoggles to "advanced" courses or conferences in Lake Tahoe is easy.
3. When things don't work, you can always blame it on the model.
2. Adds to your job security because no one else knows what the hell you did anyway!
1. Your boss thinks it's a great idea!

Top Ten Reasons to Keep Using ProVox

10. Want something with the word "pro" in it.
9. Keeps your hands busy and your mind numb.
8. No landfill is big enough for red binders.
7. Alternate, "Honeybox," is a bar in Thailand.
6. Life is dull without undocumented features.
5. Hot lines are manned by mimes.
4. Family-style meals at County Line Barbecue.
3. Training classes end up at Sugar's.
2. Neat caps, shirts, sweaters, and knives.
1. Geeks reign supreme!

Top Ten Reasons Why My Life Is a DCS FST

10. I read (I dard).
9. I write (I dawt).
8. I add (weight).

From The Control Room…

"… climbing like a rock."
— Kevin

"Hey, don't kick a horse in the mouth."
— Brian, after Joe complained about something

"It's 110 percent closed."
— Ginger

From The Control Room…

"Could you walk it through me again?"

— Wayne

"Insols are a thing of the past."

— Wayne

"Bucky, do you have a photography memory?"

— Sonny

7. I subtract (resources).
6. I multiply (much to the chagrin of my wife).
5. I divide (sometimes by zero).
4. I filter out (what I don't want to hear).
3. I have dead time (just ask me to do something).
2. I velocity limit (I don't move that fast).
1. I am convoluted (just try to figure me out).


TWilliams

25

A Brief History of the Pocket Protector

The term *nerd* seems to come from the time of the Roman grammarian Comma Colon Hyphen Wohlberger, who founded the National Elysian Reading and Dance Society of Rome in 69 B.C. Further research suggests that the Nerds were a tribe described by the Greek writer Mangoffanopolous in 777 B.C., who said they were an offshoot of the Ecdysiasts. This has not been confirmed.

The pocket protector dates from even earlier, though the Nerds did not adopt its use until the barbarians were at the Gates, circa 300 A.D. It was invented in China by the philosopher Weo Wang while he was supervising the construction of the Great Wall, repelling the Mongol invasion, and inventing gunpowder in the year 3333 B.C. The ballpoint pen he had just invented leaked on his robe, and his spouse had chastised him. Being a sensitive fellow, he invented the washing machine to make her life easier. To further comfort her, he made a small silk sack, which he hung around his neck with a gold chain. He used this prototype pocket protector to carry his pens, pencils, and abacus.

The pocket protector came into more general use during the Crusades, when Sir Ronald and Sir Richard took their retainers on a combined crusade and deer-hunting expedition to Lutesville, Turkey (or maybe it was turkey hunting in Arnold). They kept pulling out their swords when they wanted to hunt, and their bows when they wanted to fight. They solved this problem by riveting a scabbard and a quiver to the chest plate of their armor. The only drawback to this solution was that they could never agree when to do which.

It has been reliably reported that during the French Revolution, while famed architect Madame L. Weaverou was designing the great Tower of Versailles (eventually built in Paris), she carried her drawing tools and pencils in a specially constructed tote, called an *etui*. This translates roughly to "protection for the pocket." Many other references to pocket protectors can be found in the annals of recorded history, but these few contain the gist of its long and honorable history. Still, it continues to be among the most maligned articles of apparel.

"Only nerds use pocket protectors!" Teresa said recently, when your author asked if we had any in the supply room. No matter that the company president wandered by, on one of his peripatetic trips around the office, with one in his pocket. Teresa had spoken! As the Grand Pooh-bah of fashion and propriety, her word was final, with no hope of appeal. This reply left your author stuck. The really big boss at home had directed that he not mess up any more of his shirts with felt markers or those nasty screwdrivers.

From The Control Room…

"Where do duck eggs come from?"
— Brad

"You have to kill them when they're alive, like lobsters."
— Brad

From The Control Room…

"You should be learning us better."
— Don

"She's skinny but not fat."
— Joe

"Diesels have glow plugs, not firecrackers."
— Lanny

As its rich history amply demonstrates, the pocket protector should be worn proudly as a sign of efficiency, dedication, and good technical practice. Yes, your author told himself, it was time to flaunt this most venerable and useful wardrobe item, to defy Teresa, no matter what advertising is printed on it. Stand up for your right to make an engineering fashion statement, on and off the job. There comes in each lifetime a moment when a person has to take a stand on principles and brave the wrath of others, to do the right thing!

"I bet you need some duct tape for the bridge of your glasses, too," Teresa smirked.

This is definitely not the moment, your author thought. *Maybe I'll just get another pocket protector for use around the really big boss, but conceal it at the office.*

Yeah, that might work.

— Leo Lang


ZZZZZZZZZ...

26

The Top Five Reasons Why These Are the Last Lists in the Book

Rudy's Top Ten Reasons Why My Life Is a DCS Batch Operation

10. My salary has been constant (I const).
9. I develop code while I'm sleeping (I parallel).
8. I read ProVox documentation (I readuc).
7. I'm not perfect (I fail).
6. I travel a lot (I move).
5. I go where there is a problem (I ongoto).
4. I OAR (I have a lot of questions).
3. I monitor (pretty women walking by).
2. I have expressions (most of which I can't repeat).
1. I wait until (retirement).


BLUE LIGHT SPECIAL for PROCESS CONTROL ENGINEERS
Doesn't know when to GO HOME
TWO for ONE SPECIAL
Just Feed him PROBLEMS
TENNESSEE
WIND-R-BAG

From The Control Room…

"We don't want to have a violation and get citated."

— Wayne

"It left a sour note in my mouth."

— Don

Billy: *"Is this test a complete failure?"*

Tom: *"No, there is a twinkle of hope."*

Kevin: *"That turtle is going to die."*

Buck: *"They all will, if they live long enough."*

Top Ten Things to Do While You Are Waiting to Be Sold

10. Learn German or Tennesseean.
9. Change your name to Mertz or Bubba (we now have six people in our group named Bubba Mertz).
8. Look for sauerbraten or chitlins on the menu.
7. Get the best rumors from your grandmother.
6. Verify rumors with your vendor.
5. Find out what your future job will be from the psychic hotline.
4. Raise money for employee buyout by turning your training center into a fine arts theater.
3. Work on your golf game.
2. Look for a price tag on your office.
1. Start a blue light special for your group.

Top Ten Most Upsetting Expressions Heard while Response-Testing a Hydrogen Plant

10. This test will be a blast.
9. The sky is the limit.

8. Watch it go through the roof.
7. Let's blow this place.
6. Is that the biggest fire extinguisher you have?
5. Let's trend oxygen from -1 percent to 1 percent.
4. Why is the temperature off scale?
3. Was that thunder?
2. Was that an earthquake?
1. Oops.

Top Ten Things to Hold on To

10. Any application cowboy (where have all the cowboys gone?).
9. Retired experts—they know what doesn't work.
8. Any systems troubleshooter who can actually troubleshoot.
7. Special function-key maps for cute programs with undocumented features (like how to quit).
6. Installation details (what a quaint idea).
5. Any vendor who knows whether the instrument he or she is hot to sell will work.

From The Control Room…

"My brother just had a baby last week."

— Sonny

"A turtle will not die until sundown."

— Dub

"They got him for tax invasion."

— Brian

"Cole could organize a ten-car pileup."

— Joe

From The Control Room…

"… in all feasigality it should work."

— Dub

"I-70 and I-74, is that the same road?"

— Hambone

"Rossburg is on the west coast of Ohio."

— Jeff

"How would you feel if she was your uncle?"

— Brian

4. Your company's stock, no matter how little you think of it, especially if you were downsized. (The smaller you feel, the bigger the stock price. In fact, Wall Street has a new performance index called "profit-to-engineer ratio," with a divisor of zero being the optimum).
3. Tie-dyed clothes (you never know when it will be a hit again or how far casual Friday will go).
2. 3-D glasses—ask your friends to wear red and blue tie-dyed clothes and hurl themselves at you.
1. Your dongle (even if it is a beta version).

Paul's Top Thirty Signs That an Opportunity Assessment Has Gone on Too Long—and Wrong

30. Your laptop goes dead and becomes obsolete.
29. Area operators volunteer to manually shovel out the dryer in pouring rain along with other horrible duties rather than go one on one with the OA team.
28. The plant manager threatens to send you to diversity training if you use one more four-letter word.

27. You start to fantasize about diversity training instead of spending one more minute in the OA.
26. The plant personnel start referring to the OA team as Moe, Larry, and Curley.
25. To avoid sitting through another two hours, the meeting leader volunteers to fly home to snow and rain to chauffeur the kids on Halloween.
24. You start to prefer the smell of chemicals to the smell of the person next to you.
23. You start to name pieces of equipment after team members, like "Randy the Reboiler."
22. The operators start showing you photographs of their favorite guns, cousins, and livestock.
21. People in the plant characterize the OA team as "Men Behaving Badly."
20. You start to sound like a used car salesperson when trying to describe the benefits of advanced control.
19. You ditch the meeting to attend an all-day telecon with your boss Bob so you can become Bob's best butt boy.

From The Control Room…

"They were so close you couldn't get a paper machete between them."
— Joe

"I ain't never been to one, and I'll never go to one again.
— Joe

"He was incoherent, and you couldn't understand what he was saying."
— Joe

"She occurs eight hours vacation a month."
— Purdy

From The Control Room…

"I may have just fallen off the turnip truck, but she was giving me more than her share of eye contact."
— Joe

"Is there heat in the temperature?"
— Marv

"They stopped selling the free beer at 6:30."
— Kevin

Jeff: *"It's one hundred laps for fifty miles."*

Ron: *"Oh, so it's a mile track, then."*

18. You begin each session with a heated argument over whether the "No Donuts at Company Meetings" is a real or fake memo in the rumors database.
17. When the water balance is mentioned, you immediately get up and go to the rest room.
16. When someone mentions decoupling the inventory control from the concentration control, you start estimating the effect of the ten Dr. Peppers you had.
15. You find that the "sweet spot" has nothing to do with the process but is the name of the one chair in the control room without a spring sticking up in the seat.
14. There are more OA participants in the rest room than in the meeting.
13. The solution to every control opportunity is a neural network, expert system, or older-than-dirt FORTRAN program.
12. You choose the "hot dog special" so the indigestion will keep you awake the rest of the afternoon.
11. Lunch break becomes known as the "Exodus."
10. You refer to the guy belching on the "hot dog special" as "El Nino."
9. The "servers" in the cafeteria chow line start looking good to you.

8. You have a reoccurring nightmare in which you build a neural network to inferentially measure an impurity that is only correlated with your company's stock price.
7. The pressure and stress of the OA makes you actually consider giving your spouse fifty-five "You are entitled to be crabby all day" coupons.
6. You sadistically harass the guy next to you by noisily eating an apple when you know he forgot his banana.
5. You spend two hours deciding whether to install a $2,000 analyzer or if a five-year effort to build a neural network to infer moisture should go into phase two.
4. You use the term *redneck* to describe the person you told that their implementation technology is ancient history and belongs in a museum.
3. You start calling the supervisory control system "Mir."
2. You spend two weeks working on the OA summary before you realize the process improvements are the same as the ones from the OA you did five years ago.
1. The corporate guys get up and leave you behind to defend a briefcase full of nebulous crud.

From The Control Room…

"They sent him home to write an assay."

— Dub

"If you need any help with Promix, ask me. I'm a good pupil student."

— Spot

"I only need my glasses to see."

— Dub

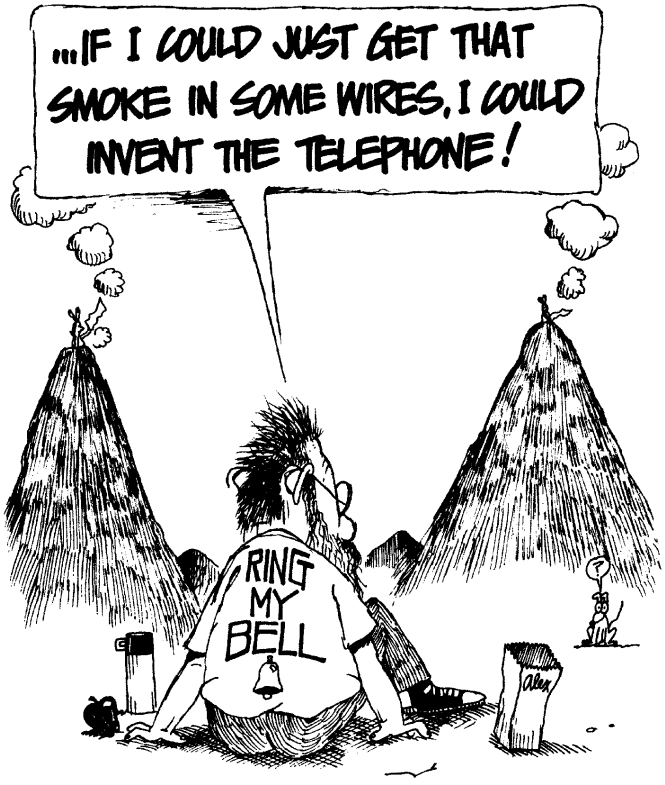
27

The Truth

As a result of a vast, ongoing study conducted by the Lang Research Institute, we have a startling (but not shocking) discovery to report to the great unwashed this month. The cherished but mystical "electron theory" we learned in school is bogus. All you have been told about electrical systems is untrue. Furthermore, we have found that mankind has been misled purposely by a small, underhanded band of grasping, greedy plutocrats and pseudoscientists.

While looking for some documentation at an electric plant, we ran across the fact that no new electricity has been produced since December 4, 1912. This was apparently when T. A. Edison learned to isolate what electricity was in its pure form—*smoke*. Everyone has observed that when the smoke comes out of electrical or electronic hardware, it ceases to work. We are ashamed to admit that we never made the connection between the escape of the smoke and the resulting malfunction of the apparatus involved. When a piece of equipment is sent out for repair, what actually is done is to reload the unit with smoke after the leak is repaired.

Let us examine the ways in which electricity is generated. At coal-fired plants, we see huge stacks emitting smoke, which is supposedly a by-product of burning coal for the heat that is needed to run a boiler to turn a turbine. We now know that it is excess smoke they were unable to capture when they


...IF I COULD JUST GET THAT SMOKE IN SOME WIRES, I COULD INVENT THE TELEPHONE!
RING MY BELL

From The Control Room…

"They want a new price for a new truck."

— Spot

"There are two kinds of racers. Cheaters and losers."

— Don

"We burned water over in Iraq, to keep it away from the Iraqis."

— Colin

"Noon around here is about 10:30."

— Meeker

"Do those decoy anchors have to go all the way to the bottom?"

— Spot

liberated it from the fuel. They do not mind that some escapes because they can recapture it another way. (More on this later.) The large spinning units, called turbines, are actually the mechanical devices used to pack the smoke in the pipes we call wires or conductors. Many devices have been added over the years, like scrubbers and electrostatic precipitator units, which we have been told are meant to clean up the environment and preserve our resources. Actually, they are used to maximize the profits of the utilities by recovering as much of the smoke in the fuel as possible.

Haven't you wondered why security is so pervasive at nuclear-powered generating facilities? You should have. It is much harder to get smoke out of uranium than out of fossil fuels, and it is correspondingly harder to hide what is being done at these sites. The best way to be sure nobody learns the truth is to keep them away from the plant. As for the workers, the truth is hidden behind massive (but useless) shielding, ostensibly for their own protection. The "steam" seen escaping from the cooling towers is really smoke that was not captured for packing into the conductors. The implication that nuclear theory is untrue also should be plain to all clear-thinking people.

Another piece of the puzzle is apparent at hydroelectric plants. Smoke is not as soluble in water as it is in coal or uranium; but it is in there. The hydroelectric facilities are actually giant smoke filters, which are used to recover the smoke that has escaped from the coal-fired and nuclear plants and then subsequently dissolved in water. The turbines at these plants turn more slowly because the smoke recovered from the water is less dense than that recovered from the primary sources, and it does not require as much force to

pack it in the pipe. This method is very efficient comparatively, and as a result no smoke can be seen coming from this type of facility. Finally, the last bit of smoke that is in the air is loaded in wires using wind turbines or windmills.

What does all this means to the user? (We do not say *consumer* because the Law of Conservation of Mass and Energy tells us that we cannot use up the electricity, as the utility companies would have us believe.) Amazingly, we did not notice this paradox before but, like you, were blinded by our early schooling. This is what was intended.

Has anyone else ever wondered why the second and third wires were needed in an electrical line? If they sold us the electricity and we used it, why should we need a second wire to "complete the circuit," and later a third wire as a safety ground? We have wondered about this a lot over the years, and only now has the establishment's ruse become transparent.

These wires are needed, but it is *their* system that needs and uses the other pipes, not yours. The electric company sells you the smoke, pipes it to your house, and you use it. If that were the end of it, you would quickly discover that once you bought enough to run everything in your house or business, you could shut the valve (they call it "turning the switch off") and do without the utility company. As long as there were no leaks and no added loads, you would never need to buy any more electricity. The second wire in the system is actually a return pipe to the utility storage tank. The electricity is sold to us, as users, but we are not allowed to keep it and use it. We must immediately send it back so we can be required to buy it again, at an ever-increasing cost.

From The Control Room…

"I'm working the five-in-the-morning-to-three-in-the-morning shift."

— Purdy

"I'm going to keep a real low keel."

— Spot

"If we get through this run smoothly and no one gets hurt, the wallets are going to come out."

— Tim

"I'm getting dizzy flashes."

— Jeff, after hitting himself in the head with a frozen burrito

From The Control Room…

"Stop talking with your mouth open!"

— Ball

"I think Thursday is on the same day every week."

— Purdy

"Is it possible they killed each other?"

— Pravin, talking about Nicole Simpson and Ron Goldman

"Startup insols are harder to control than regular insols."

— Wayne

"I think the fact that I'm in unfamiliar territory throws off my ETA."

— Spot

Doesn't it make your blood boil when you see how easily we have been duped over the years? Yes, it is true. The only purpose of the second wire is to allow the establishment to sell the user the same product over and over without the user knowing it.

The third wire is a recently added item. When it was found that smoke was more soluble in water than air, because of the differences in density of the mediums involved, the third wire was added. It is more efficient to pipe the excess smoke to the ground to be dissolved in the groundwater and recovered at the hydroelectric plant than to let it escape to the atmosphere and get it back using the relatively inefficient windmill techniques in existence today.

Once you know the real truth, you can see how widespread the conspiracy is and how deeply our society is infiltrated by this cabal. The sad truth is that, like most of you reading this, your author makes his living in part by perpetuating this deception. We must all decide whether our moral integrity and personal ethics will allow us to continue to do this. After much soul-searching, your author has decided to let the cat out of the bag and let the chips fall where they will. This is not an attempt to dictate to others what they should do. Anyone who wants to may continue to bilk the public. If you choose to be a con man and cheat innocent people that is your business (mean and rotten as it may be). If this honesty costs your author his livelihood, then perhaps he can get a job selling used cars, or become a politician.

— Leo Lang

Answer

Flowmeter Stardate 2057.5. Answer: No. 1, the mass flowmeter.

From The Control Room…

"I usually control my tickling."
— Sonny

"The washer feed tank is flowing up gravity?"
— Wayne

"I heard it out of the corner of my ear."
— Wayne

From The Control Room…

"Do we need to put down Ice Dry?"
— Wayne

"The tank is on the roof of the second floor."
— Wayne

"The tank is bone empty."
— Wayne

About the Man in Control

Gregory K. McMillan is a jolly good Fellow in the Integrated Manufacturing Control group at Solutia, which specializes in process control improvement to reduce the cost of goods sold and improve onstream time and capacity. Gregory was with Monsanto for many years before joining Solutia over a year ago. He also had a brief stint with the Don H. Munger Company, where he appreciated what it was like to be a vendor.

Gregory received a B.S. in engineering physics in 1969 from the University of Kansas and a M.S. in electrical engineering (control theory) in 1977 from the University of Missouri–Rolla. He spent the first year of his career trying to apply quantum theory to batch sequence control.

Gregory is a Fellow at ISA. He received the ISA Kermit Fischer Award for outstanding environmental service in 1991 because of his accomplishments in pH control. In 1994, Gregory was also named Engineer of the Year for the chemical industry by *Control* magazine. He has published ten ISA books, the most popular of which have been *Tuning and Control Loop Performance* (2d ed., 1994), *pH Measurement and Control* (2d ed., 1994), *How to Become an Instrument Engineer* (with S. Weiner, 1987), and *A Funny Thing Happened on the Way to the Control Room* (1989). His most recent book (apart from this one)

is *Advanced Temperature Measurement and Control* (with Chris M. Toarmina, 1995). Most of them carry warning messages to not operate heavy machinery while reading them, have been widely used as sleep aids, and have been known to have serious side effects (such as installing pH electrodes and model predictive ecstasy control in your hot tub).

Gregory spends most of his time pushing control and tennis limits and discovering new trajectories for control variables and golf balls. He prefers to ride constraints rather than horses and avoids looking gift horses in the mouth.

From The Control Room…

"A guy I knew had a chair that somebody shot himself in, and it would rock by itself at night."

— Spot

"I don't want to go to St. Louis or any other state."

— Rudy

"You shouldn't be hungry. You just ate a whole flock of fish."

— Moondog