

## Homer Alan Mantooth

# High-powered engineer

### SELF PORTRAIT

**Date and place of birth:** Jan. 26, 1963, in Hot Springs

**Occupation:** Distinguished professor of engineering, University of Arkansas at Fayetteville

**Family:** Wife Mary Lynn, daughters Deanna Lynn, Laura Kathryn and Maureen Elaine

**The biggest misconception people have about my work is that I have summers off.**

**My favorite track and field event to officiate is the pole vault.**

**The subject I'm most interested in, outside of work, is outdoor pursuits — hiking, hunting, golf.**

**My advice for fathers with daughters is let them really get to know you, learn about their interests and spend time with them.**

**What I like about Siberian huskies is they are beautiful, pack-oriented, working dogs with a spirited personality.**

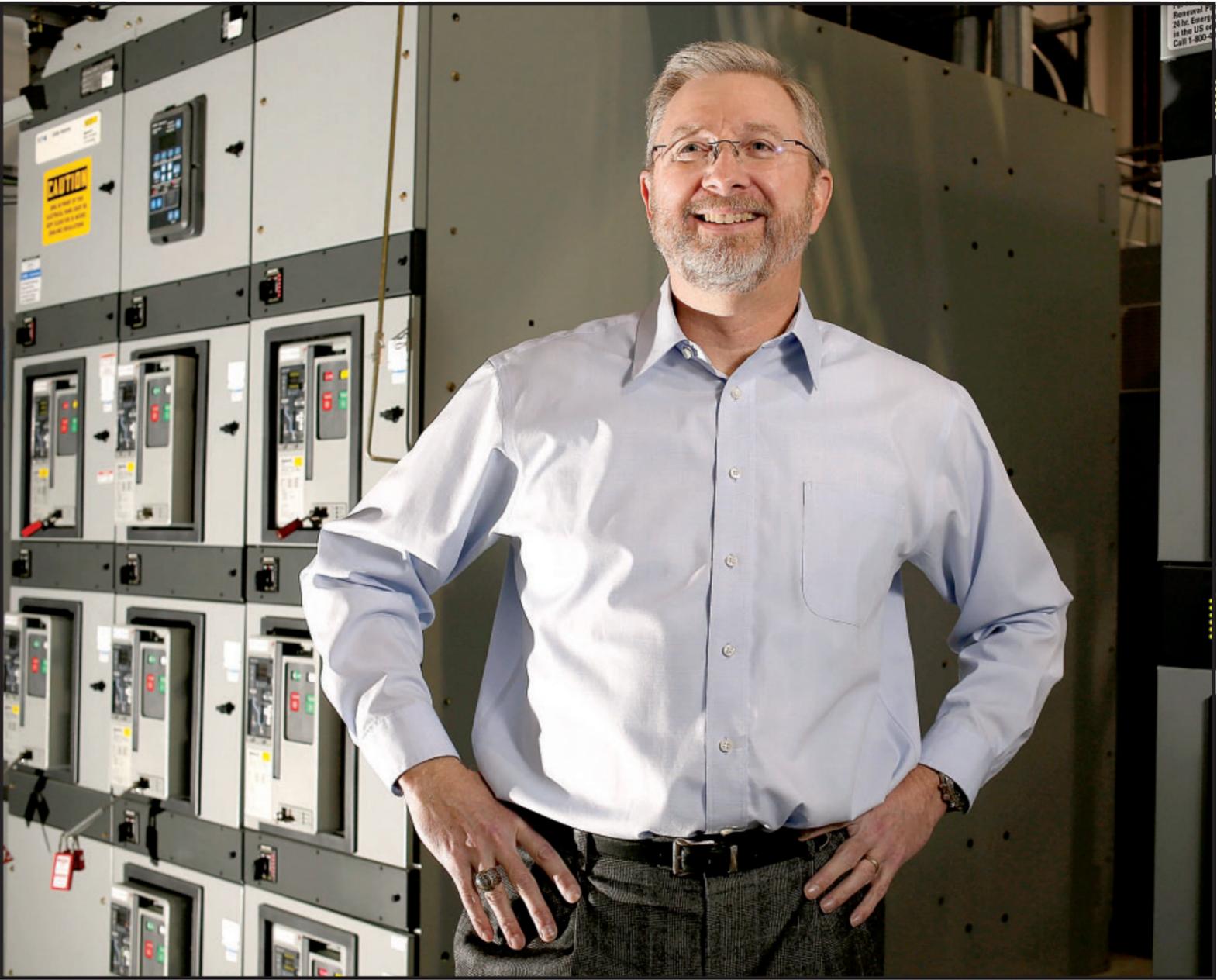
**My top vacation spot is any place in the Rocky Mountains.**

**The last time I made a B in school was in my final math class at Georgia Tech during my doctorate.**

**If I had an extra hour a day, I would finish woodworking projects.**

**The best advice I ever received was, "Do your best to be the best at what you do. Everything else will take care of itself."**

**A phrase to sum me up: competitive, hard-working, loyal family man of deep faith**



NWA Media/DAVID GOTTSCHALK

"I'm not satisfied with the theory only. I want to validate it in practice, and I want to put it to good use."

**F**AYETTEVILLE — Alan Mantooth is working toward a day when the only way you discover your power has gone out is by watching the news on TV.

"I'm not satisfied with the theory only," says Mantooth, a distinguished professor of electrical engineering at the University of Arkansas at Fayetteville. "I want to validate it in practice, and I want to put it to good use."

Your house's power would stay on during a blackout because there's a universal power router in the garage.

This router is about the size of a standard breaker box and receives feeds from a meter, solar panels on your roof and a battery backup system. This router continually uses the cheapest power source to recharge batteries at night and relies on solar power during peak hours.

Sounds pretty good, right? This would undoubtedly slash your monthly electric bill.

The real bonus comes during a blackout. Right now, there's not much you can do except stumble around for a flashlight. (In most cases, it's currently illegal to use solar power during blackouts, because it may back-feed the grid and hurt linemen working to restore the power.)

If you have this universal power router, though, you wouldn't even know the power had gone out.

RICH POLIKOFF  
 ARKANSAS DEMOCRAT-GAZETTE

"He's been carefully building on specialist techniques in a number of areas, [including] power electronics and packaging in general," says Peter Wilson, a reader in electronics and computer science at the University of Southampton, England. "This will be absolutely critical over the next two decades of high-powered engineering — in utilities, the grid, power systems. [Mantooth's work] will have a huge impact."

Mantooth is the executive director of three power electronic system centers in Fayetteville and played a major role in bringing them to UA.

One is the National Science Foundation Center on Grid-connected Advanced Power Electronic Systems, or GRAPES. It works on power electronic devices such as electric vehicles and has developed a universal power router, which Mantooth calls "boards on a table." By the end of the year, it hopes to have a second built and deployed in a residential setting.

There's a strong chance it will be tested on the 65-acre property Mantooth's family shares with his in-laws west of Fayetteville.

"Put your money where your mouth is," Mantooth says. "I've got a separately metered wood shop, and we could use it as a model home."

"We're trying to make [the router] so cost-effective that it would pay for itself in a few years. It would be a no-brainer."

If this was the only thing Mantooth was working on, it would be impressive enough. In reality, though, GRAPES is merely part of his career.

Through the National Center for Reliable Electronic Power Transmission (NCREPT), Mantooth is working on ways to modernize the electric grid itself and reduce the frequency of power failures and their duration. NCREPT also works on energy exploration and transportation issues.

And then there's his work on solar power through the National Science Foundation Vertically Integrated Center on Transformative Energy Research (VICTER). Not to mention teaching, advising students, and everything else that comes with being a professor.

"Some of the work Alan's been doing on power devices, he's not just leading in a national sense, he's internationally leading," Wilson says. "The kind of things that are going on in Arkansas are going to have an impact in global industry terms."

### A DIFFERENT ROUTE

As a child, Mantooth didn't dream of becoming an engineer.

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## SPOTLIGHT WASHINGTON REGIONAL FOUNDATION'S 20TH ANNUAL GALA AND EAGLE AWARDS

# Gala to upgrade beds for critical care unit

RICH POLIKOFF  
 ARKANSAS DEMOCRAT-GAZETTE  
 FAYETTEVILLE — Jennifer Bonner can't wait for the Washington Regional Foundation's 20th annual Gala and Eagle Awards.

It's not because she's the world's biggest fan of Kool and the Gang, although she thinks it's "pretty cool" that the foundation is bringing in the chart-topping band for their annual fundraiser. Rather, it's because the proceeds from the gala will benefit the critical care unit at Washington Regional Medical Center.

Every year, the gala benefits one aspect of the hos-

pital, and this year's recipient is Bonner's department. A registered nurse, Bonner is the clinical educator for the critical care and intensive care units.

"We need new beds to take care of our patients," says Bonner, who lives in Lincoln. "Those beds are very expensive and very helpful in our patient care. The money they raise [at the gala], that's hard to come by."

"The beds we have now are 12 years old, and in the critical care equipment world, that's ancient."

The patients who wind up in the critical care unit

have "serious and sometimes quite debilitating illnesses," Bonner says. Often, they require long stays, and the mere act of getting out of bed is extremely difficult.

The TotalCare SpO2RT2 therapy beds the patients stay in perform continuous lateral rotations, which when combined with nurses repositioning patients, greatly reduces their chances of getting bed sores or developing congestion or other problems with their lungs. The therapy beds can perform chest-compression therapies, tapping patients on the back and further re-

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**Jennifer Bonner** is the clinical educator for the critical care unit at Washington Regional Medical Center. The unit will be the beneficiary of the Washington Regional Foundation's 20th annual Gala and Eagle Awards.

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# UA professor plugs in to power electronics

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In fact, when he enrolled at UA in 1981, he “didn’t even know what an engineer did.” Mantooth hailed from a blue-collar family, a descendant of a long line of men who worked with their hands and were capable of building anything, even a swimming pool and houseboat.

Mantooth was a bright kid and although he was co-valedictorian of his Jacksonville High School graduating class, academics wasn’t his most pressing concern. It was sports.

Football, basketball, baseball, track, whatever was in season, Mantooth played it. He won a state championship in football at Jacksonville High School and rarely passes up an opportunity to volunteer as a track and field official for the Razorbacks.

“My youth was spent on a ball field of some sort,” he says. “I came here primarily because of football. I grew up listening to Bud Campbell and the Razorbacks on the radio, so since I was 5 or 6 years old, I always wanted to be a Razorback.”

Although he had other scholarship offers, Mantooth chose Fayetteville. He got into a game on Oct. 11, 1981, against No. 1 Texas (a 42-11 Hogs victory), but at the end of the season he came to a stark realization: It was time to give up the sport.

That first year of college was exhausting for Mantooth, a nonstop sequence of classes, practices, weightlifting and studying. So he walked away from football and into engineering.

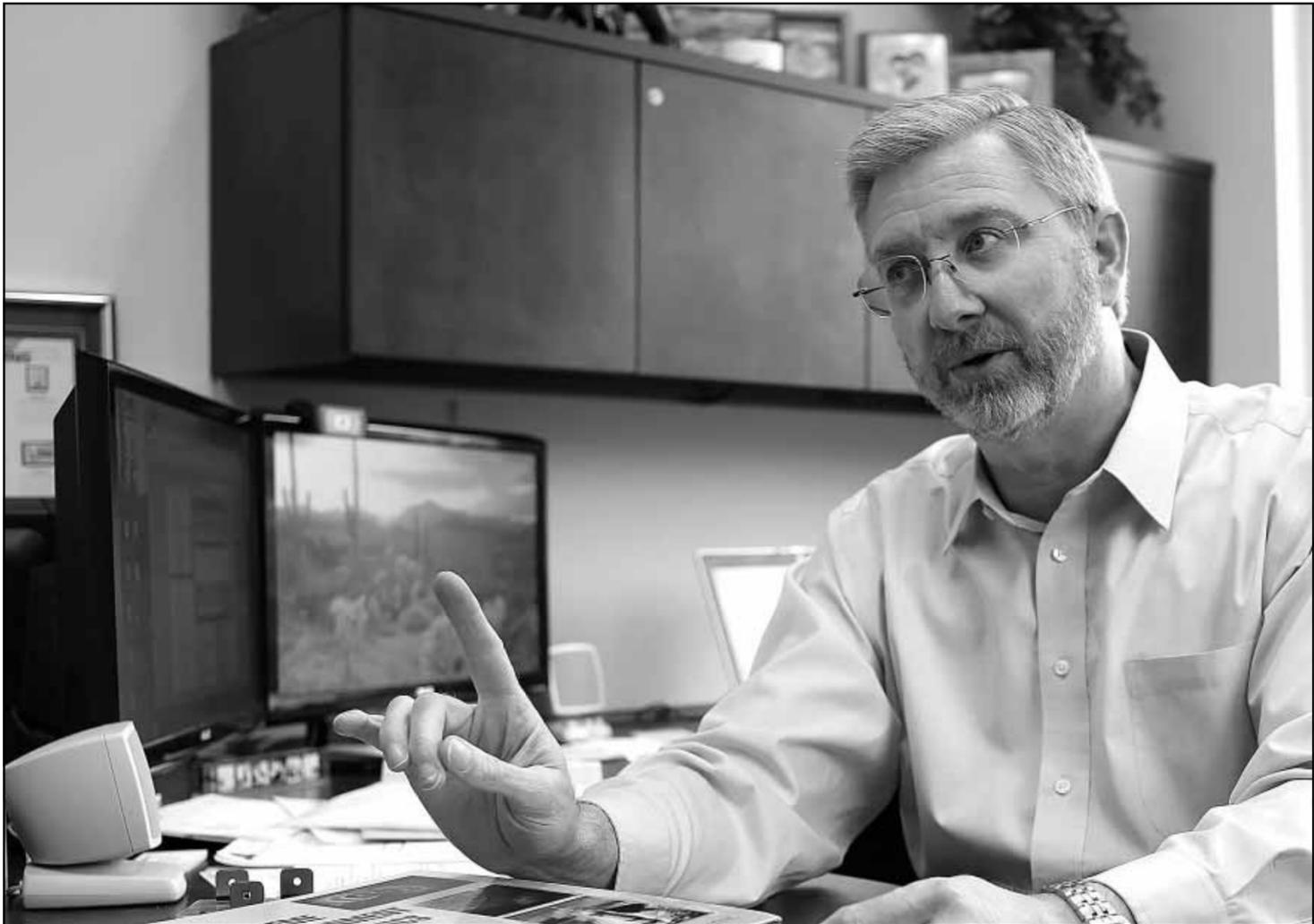
“I thought, ‘I’ve gotten a lot of fun out of it but I’m not going to be a pro football player, so maybe I should figure out what I am going to be a pro at,’” he says.

Although he had always excelled in every subject, Mantooth gravitated toward math and science as a kid, enjoying the certainty of its answers as compared to the humanities. (For what it’s worth, Mantooth has a hawk’s eye when it comes to the mechanics of the language.)

He entered college as an industrial management major, taking a general course load. By the end of the year, he realized his favorite classes had been sciences, so he started talking to different engineering professors and realized that electrical engineering was where he wanted to be.

It was the early years of the personal computer era, and Mantooth describes electrical engineering as “like a wave you wanted to get in on.” He received his bachelor’s degree in 1985, finishing with a perfect 4.0 grade-point average, and then got his master’s in electrical engineering from UA in December 1986, requiring just a year and a half to complete a two-year course load.

“Alan studied more than anyone I knew,” says longtime friend and former roommate Scott Morris of North Little Rock. “He is one of the smartest people you’ll ever meet, and he combines that with an incredible capacity for work,



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“My youth was spent on a ballfield of some sort. I came here primarily because of football. I grew up listening to Bud Campbell and the Razorbacks on the radio, so since I was 5 or 6 years old, I always wanted to be a Razorback.”

which is a formidable combination.”

## SEEKING ANSWERS

Mantooth has a fantastic sense of himself.

It goes beyond knowing when it was time to quit football or what sort of engineering would best suit him. The man knows how to make great use of his time — a critical skill for someone who is a devoted father of three teenage girls.

Mary Lynn Mantooth describes her husband as “having a mobile calendar.” She puts all the girls’ school, athletic and music activities on that calendar, and Alan figures out how to arrange his schedule so he can make it to as many of them as possible. “He’s just so methodical,” says his wife of more than 25 years. “He says, ‘Right now I’m going to work for an hour on grading tests,’ or editing his books, and when he’s finished doing that he moves on [to the next task].”

Alan Mantooth also recognizes a great opportunity and understands how to make the most out of it.

While an undergraduate at UA, he had two internships with Texas Instruments in the summers of ’84 and ’85. The second summer he worked in the circuit-design group, which “was really the springboard for the rest of my career.”

While working on his master’s, Mantooth designed his own chip for Texas Instruments. This was a rare opportunity and Mantooth

made the most of it; his chip was successful, and became part of infrared night vision goggles used by helicopter pilots. (Mantooth says his design was likely refined by senior engineers after he finished working on it.)

“Once he showed me an equation written out” for the chip, Morris says. “It filled virtually an entire 8 1/2-by-11 paper, and there was not a single number on it! It was just a string of symbols.

“... But what makes Alan remarkable is that he is able to communicate highly technical material to people like me, for whom balancing a checkbook is a challenge.”

Mantooth’s master’s degree adviser recommended he go to another school for his doctorate, so he enrolled at Georgia Institute of Technology. He had a graduate research fellowship there, sponsored by a semiconductor industry consortium.

This allowed him to travel around the country, visiting companies and asking what they considered their most-pressing need. They said they needed advanced modeling capabilities — a way to simulate the behavior of chips, without actually going to the enormous expense of building and testing the chips.

When he finished his doctorate in 1990, Mantooth had several promising teaching offers as well as professional offers from Texas Instruments and IBM. Instead, he decided to go to Analog, a start-up company in Oregon

that sold computer-simulation software.

It wasn’t the most lucrative offer but Mantooth was intrigued by the variety Analog would offer. The location was also a factor; the Mantooths love the outdoors, and annually plan a week-long family camping trip.

“Alan is very bright, articulate and driven,” says Ian Getreu of Portland, who was Mantooth’s manager at Analog. “There were not a lot of people doing state-of-the-art analog mixed signal modeling. It was a no-brainer [to hire him].”

Mantooth spent eight years with Analog. He worked in several departments, including marketing and sales, and spent his final three years working to create automation tools for modeling work — meaning that he developed faster systems of designing models.

This project existed because he wrote, and received, a multimillion-dollar grant from the National Institute of Standards and Technology. Then he assembled a team of 10 engineers.

“[The project] performed exactly as it was supposed to perform and was within budget,” Getreu says. “What Alan and his team did was flawless.”

## MAN OF DISCOVERIES

This experience at Analog was enormously valuable to Mantooth.

“You learn critical thinking, to see that people have problems to solve and failure

is not an option,” says Wilson, who like Mantooth worked in industry before entering academia. “And you learn to be organized and focused on goals, to not get distracted.”

Mantooth came back to Arkansas in 1998. The timing was ideal, as he had just finished his modeling project and none of his daughters had begun school.

The chance to move closer to his and his wife’s families played a big part in their decision. Mary Lynn Mantooth is also from Jacksonville — her father was Alan’s doctor growing up — but they didn’t meet until they attended UA.

“He loves coming in the door and then four women surrounding him to give him hugs and kisses,” Mary Lynn Mantooth says. “... Ultimately, his faith [the Mantooths are longtime members of First Baptist Church in Fayetteville] and family are the most important things to him.”

Nevertheless, when the Mantooths came back to Fayetteville, Alan had a warning. If his family thought he had been busy before, just wait.

“He said, ‘I don’t want you to think being a professor is easier. It may be more time-consuming because it’s ultimately three jobs — teaching, research and advising students,’” Mary Lynn recalls. “From the day he got here, his hours lengthened.”

In 2005, he helped establish NCREPT at UA; its \$5 million test facility was completed in 2008. A year later, he won a grant from the Nation-

al Science Foundation, which created GRAPES, and in 2010, he won another foundation center, VICTER.

He was part of a team that designed electronics technology that could withstand radiation and extreme temperatures for NASA and collaborates with people throughout the world on projects. He has won an *R&D Magazine* “top 100 innovations in the world” award for high-temperature electronics in 2009, the same year he was inducted as a fellow in the Institute of Electrical and Electronics Engineers, and two years later won an Arkansas Alumni Association Distinguished Faculty Achievement Award.

Mantooth just finished his third book, *Model-Based Engineering for Complex Electronic Systems*, which he co-authored with Wilson. The book “bridges the disconnect between theoretical books and how-to books,” Wilson says, an attempt to make complex concepts understandable for practicing engineers designing electronic systems.

Mantooth has also continued to advise 25 graduate students at any given time. That’s a huge number for a professor, but he relishes the opportunity to work with so many young people.

“It sounds corny, but he has a real commitment to excellence,” Morris says. “If I had a child who wasn’t sure what they wanted to major in, I might send him to Alan just for the experience of working with him. He’s a great role model for young people.”

## Bonner

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ducing the risk of lung-related problems.

They are also capable of gradually transitioning patients from a horizontal position to a seated position, making it easier for them to get out of bed and move. The bed’s transition can take place quickly, or over a handful of days, whatever patients can tolerate.

“Even small movements can make a huge difference,” Bonner explains. “Research shows that that kind of early mobility improves your patient outcomes. ... These beds are absolutely a must-have for our patients.”

The 20th annual Gala and Eagle Awards will be April 2 at Walton Arts Center in Fayetteville. Tickets to the show are \$75 each, and include a reception before the show.

Kool and the Gang had 25 songs that reached the top 10 of the *Billboard* U.S. R&B/hip-hop singles charts between 1973-1987. The band is perhaps best known for its chart-topping single “Celebration,” a staple at weddings

and festive events even since its 1980 release.

At the preconcert reception, which starts at 6 p.m., the foundation will be honoring its 2013 Eagle Award winners. They are the late Dr. George Cole, a longtime Washington County obstetrician and gynecologist; Dr. David Ratcliff, Washington Regional’s chief medical officer since 2004; and the Cancer Challenge nonprofit organization. The Cancer Challenge has raised more than \$9.5 million to support cancer prevention since its inception in 1993. (The 2013 Cancer Challenge is June 27-29. It includes golf and tennis tournaments, trap shooting, run/walk events, and the Sparkle & Spurs Gala.)

“During this very special 20th annual Gala and Eagle Awards, we gratefully acknowledge and thank our generous donors and volunteers who have made this event so successful over the past 19 years,” says Amy Lini-

mon Mason, Washington Regional Foundation’s special events director. “The health of our Northwest Arkansas community has been greatly improved because of the leadership and vision of this year’s



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The Washington Regional Foundation’s 20th annual Gala and Eagle Awards will benefit the critical care unit at Washington Regional Medical Center. Jennifer Bonner is the unit’s clinical educator.

Eagle honorees.”

In years past, proceeds from the gala have totaled more than \$1.2 million. In turn, this has benefited the neonatal intensive care unit, the Willard Walker Hospice Home and the emergency department.

Bonner and the other medical personnel who work in the critical care unit are excited

about what the 2013 gala will mean for their department. The critical care unit has 40 rooms, and currently has 36 therapy beds, so the first goal is to get four additional beds, bringing the unit to capacity.

Any additional funds will be used to replace the 12-year-old beds currently in the unit. “We’re now a Level 2 trauma

center, as of this year, so we need more of [the beds], and we definitely need new ones,” Bonner says. “They’re very helpful.”

For more information about the Washington Regional Foundation’s Gala and Eagle Awards, call the Walton Arts Center box office at (479) 443-5600 or visit [wregion-al.com/koolandthegang](http://wregion-al.com/koolandthegang).

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