

IN-SERVICE



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NEW TRANSMITTER AT KCUR

For the last several weeks I have been up to my eyeballs installing the new digital transmitter at KCUR. KCUR is the University of Missouri, Kansas City NPR affiliate FM radio station. This work is the culmination of almost a year of planning. We received word that we were getting the Corporation for Public Broadcasting (CPB) about a year ago. The Chief Engineer assigned the project to me. Now for the description of what it actually is.

Technically it is an In Band-On Channel (IBOC) system. Unlike the TV digital system, there are no additional channels or frequencies. The digital signal will be squeezed into the same FM 200 KHz assignment that is already licensed. Therefore it is an IBOC system. To describe the new digital service basic understanding of FM Broadcast is required.

FM, particularly FM Broadcast, is a unique animal. The carrier swings through the assigned frequency or channel in sync with the modulating frequency. Therefore at any given instant most of the spectrum is sitting idle. This has been used for years to transmit additional information. There are two distinct examples of this use. When you look at an FM signal it is a system of modulation that is also modulated. The first demodulation produces what we call the baseband, which looks from 0 KHz or carrier frequency out to 75 KHz. We will ignore the other sideband here because it is a mirror image.

The first and most widely known is stereo. FM stereo uses two subcarriers to provide the stereo signal. The first is a 19 KHz pilot that is modulating the main carrier at 10% referenced to 75 KHz deviation (100%) or swing. This pilot is used to demodulate the stereo subcarrier. It is also what turns on the stereo light on your receiver. The FM Broadcast system has an audio bandwidth of 15 KHz. Much like 20 M SSB is limited to 3 KHz of audio, in FM everything above 15 KHz is filtered out. Once the audio is filtered it is matrixed so that Left and Right Channels are added to provide the main modulation (monaural). This allows non-stereo receivers to be backward compatible and therefore still hear all the audio. At the same time as the Left and Right are added they are also subtracted. This produces the stereo subcarrier modulation. This audio is then used to modulate a 38 KHz subcarrier. But this is NOT FM. It uses AM double sideband-suppressed carrier. This is just like 20 M sideband except that both the upper and lower sidebands are present. If I did my math right, twice 19 KHz is 38 KHz. The 19 KHz pilot frequency is doubled to 38 KHz and reinserted into the 38 KHz stereo subcarrier in phase, which provides synchronous AM demodulation. The matrixed audio and the main channel are again added and subtracted. Here you need algebra to get the right answer. $(L+R) + (L-R) = 2L$ and $(L+R) - (L-R) = 2R$. This is encoded at the FM transmitter site and is decoded in your receiver. All this happens in real time.

The second example of using idle FM spectrum is SCAs (Sub-Carrier Authorizations). We are still looking at the baseband of the FM signal. These are very similar to 2 Meter FM signals except for the carrier frequency. The audio,

usually limited to 5 KHz, is used to FM modulate the subcarrier frequency. These are chosen to not interfere with other baseband signals. The first SCA is usually 67 KHz. At KCUR this is used for a Reading Service for the Blind and Print Impaired. Kansas Audio Reader provides the audio for this. KCUR only provides the transmission medium. The second most widely used SCA frequency is 92 KHz. We rent out KCUR's 92KHz SCA to Vietnamese Public Radio. Another common use is for Muzak commonly known as elevator music. Any FM broadcast station can rent out either of these SCAs for possibly several thousand dollars per month.

So far, this has been a tour of the FM Broadcast signal. The meat of this article is the addition of the Digital signal inside of the 150 KHz (2 times 75 KHz deviation) channel. There are also two 25 KHz guard bands either side of an FM signal for a total of 200 KHz. This is why FM signals occur at odd tenths of decimal numbers (99.9, 100.1, 100.3, and etc.).

A company named IBiquity licenses the IBOC digital modulation technique. The digital audio at 44.1 KHz sampling rate (the same as CDs) is applied to the encoder, which takes several seconds to produce the signal with is amplified in a linear fashion much like using a linear amplifier for SSB on 20 M. This signal is injected into the normal FM broadcast signal inside the 150 KHz band. The analog signal is delayed precisely the same time as the digital signal takes to be encoded. Therefore both audio signals are still synchronized. This is a requirement so that if the digital signal fails because it has too many errors (just like a computer parity check) then the receiver "falls back" to the analog signal. The digital transmission does not require as strong a signal at the receiver to produce the same results and therefore it is transmitted 20 dB below (1/100th) the analog carrier power level. At KCUR our antenna has a gain of about 4 (6 dB), which means that to produce 100,000 Watts of Effective Radiated Power (ERP) our transmitter must produce about 25 KW. The digital signal is added in at a power level of 250 Watts. I am simplifying the procedure here. When a local station adds this digital modulation, due to the encoding process and the delay in the analog signal, there is a six to eight second delay between when a person speaks and when the public hears it (as we call it Off-Air). If you have further questions, I can answer them privately at rhcross@swbell.net or check out the official website: http://www.ibiquity.com/technology/hdradio_how.htm

Right now there are no home radios available. The only radios produced are for vehicles. Do a web search to find resellers. The Kenwood brand uses a system where two boxes are required to produce it. The first box is basically an amplifier then another box is added to demodulate the signal. Either a digital satellite (XM or Sirius) demodulator OR a HD Radio demodulator can be added to the amplifier. If you are in the market for a new car these radios should be available within two years.

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Robin Cross WØFEN

TRAVELING ON 2 METERS

My YL (Lynda, KBØUBT) and I recently took a mini-vacation to Hot Springs, Arkansas. As many are aware, we are both teachers. I teach for Graceland University and Lynda teaches for the public school in Lamoni, Iowa. Both schools coordinate their spring breaks for the same week. This gave us the time together for the trip.

Since I have become interested in EchoLink, I was looking forward to using linked repeaters along the way to communicate with family and friends back in Lamoni. EchoLink uses the Internet for Amateur Radio voice communications computer-to-computer, radio-to-radio, computer-to-radio and radio-to-computer.

Before leaving, I downloaded the list of active EchoLink nodes to my Pocket PC. I did this by first opening the EchoLink application on my desktop computer at home. I then displayed the Index view of active nodes. In this view, I selected and copied the entire list. I pasted the selection into a text file document using Notepad. Finally, I saved this file in the folder on my computer that is set up to automatically synchronize with my Pocket PC. Note that this did not give me a list of all EchoLink nodes; just those that were active at the time. Even so, repeaters and link nodes tend to be more reliably active than individual users. I figured my list would be usable for the trip.

The radio I used for the trip was an ICOM IC-2100 that I borrowed from Jon Barney (AAØOS). This rig, with 50 watts output into a mag-mount 5/8 wave antenna, would enable me to work repeaters and links reliably as we traveled. Indeed, as we traveled south from Lamoni, I was able to work Jon (AAØOS) and Jeff Brandt (KCØDIQ) through the WØSHQ repeater in Lamoni reliably for over 30 miles south of Lamoni.

My next contact was Jeff Winship (NØOXK) through the WØSHQ repeater in Independence, Missouri. The list of EchoLink nodes I had downloaded to my Pocket PC did not include any repeaters or links in the Kansas City area. And unfortunately, Jeff was unaware of any either. After chatting a bit with Jeff, he destinated and we signed with each other.

My next contact was Robin Cross (WØFEN). Unfortunately, Robin was also unaware of any EchoLink radio links in the Kansas City area. In his mind, there were two reasons for this. First, those with the technical know-how to make an Internet EchoLink node work may only have dial-up Internet connections, or they may be disinterested. Second, those with dedicated Internet connections and the interest may not have the technical know-how.

Unfortunately, the same story was repeated all the way to Hot Springs. Adding to this was the problem of CTCSS (also known as PL) tones. These sub-audible tones are used to reduce interference on a repeater system, but one must know the codes to use the repeaters. Prior to the trip, I was unaware of any place where these codes were published. Fortunately, during the week in Hot Springs, I was able to spend some time at the San Francisco Bread Company, which is a local Internet "hot spot". (A "hot spot" is a location providing wireless Internet access.) There, I was able to search the Internet for "repeater directory", and found a site including lots of useful information on repeaters across the country, including many with PL codes. The URL of this online repeater directory is <http://www.artscipub.com/repeaters/>.

Incidentally, I had hoped to use the wireless access point at the San Francisco Bread Company to run the EchoLink application program from my notebook computer. Unfortunately, their network blocked what is called "User Datagram Protocol", or UDP. UDP is a network protocol that enables a computer to receive unsolicited data packets from the network. EchoLink requires UDP to enable connections to other stations. As a consequence, I was unable to connect with any EchoLink stations from there. However Jon Barney (AAØOS) later reported to me that he had heard our EchoLink node in Lamoni announce my call sign. But the lack of support for UDP caused my connection to time out before I could transmit any audio.

Even for repeaters that were listed as active EchoLink nodes, and even when I knew the PL code (through trial and error of testing each of the 38 possible PL codes, being told the code by a ham on another frequency, or from the online repeater directory), I was never able to establish an EchoLink connection.

I also recently traveled from Lamoni to Eau Claire, Wisconsin with another Graceland faculty member and some students for a computing symposium. This time, I took my Pocket PC loaded with both the EchoLink data base, along with the repeater directory for the states of Iowa, Minnesota and Wisconsin. On this trip, my attempts to use EchoLink to link back to Lamoni were only somewhat more successful. I was able to use a repeater in Owatonna, Minnesota to connect to the Lamoni repeater via EchoLink. Unfortunately, nobody in Lamoni returned my CQ.

Although this experience was not entirely positive, it helped me realize two things. First, I realized what a service the Lamoni Amateur Radio Association (LARA) provides to traveling hams. LARA maintains a repeater with a reliable radius of coverage of at least 35 miles. A dedicated EchoLink node is linked to the repeater. Using this system, a ham could maintain contact with virtually any other ham in the world. The ham on the road would need only a 2-meter radio, while the ham "back home" would need only an Internet-connected computer with a sound card, microphone and speakers or an Internet-connected radio link such as we have in Lamoni. At the ASCRA Board of Directors meeting this coming June, I will be working with the directors on ways that ASCRA can encourage the development of additional EchoLink radio nodes.

The second thing I realized is how helpful it is to access repeaters where local hams actually monitor the frequency. Often, I need local information as I travel, and having a ham who can provide directions or other information is extremely helpful and appreciated. I encourage all ASCRA members to monitor their local repeaters, and to respond to travelers who call for any station on the frequency. This is good citizenship for amateur radio operators. Beyond being good citizens, one of the purposes of amateur radio is to provide communication support in the event of an emergency. Monitoring the repeaters makes us more accessible in the event an emergency response net is called. In these ways we can further the goals of the Amateur Radio Service. Related to this, it is important to exercise various repeater and simplex frequencies as we travel. For if we as amateur radio operators do not use our frequencies, we will most surely lose them.

73 de kgØii
Bob Farnham
ASCRA President

STILL LOOKING FOR "E.T."

Bob Farnham (KGØII) recently achieved a milestone in the search for E.T. Bob is one of 5.4 million computer users world-wide who is participating in the Search for Extraterrestrial Intelligence project, known commonly as SETI@home. SETI@home is a scientific experiment that uses Internet-connected computers. You can participate by running a free program that downloads and analyzes radio telescope data.

At this writing, Bob is rapidly closing in on 7,250 work units completed. Out of all SETI users, Bob's rank is 41,734th place. While that does not sound like anything to write home about, Bob has completed more work units than 99 percent of all users.

Individual SETI users may optionally join one of the many groups in the SETI project. ASCRA is one such group. The following number of work units of ASCRA group members is current as of April 20, 2005, listed in descending order of total work units completed:

Bob Farnham (KGØII) - 7242
Hale Collins (W6RWH) - 5409
Bill Collins (WB6OTG) - 3516
Rod Schall - 3516
Robin Cross (WØFEN) - 1252
Ralph Stetson (KD1R) - 907
Terry Redding (W6LMJ) - 696
Joe Ayers (AD6VD) - 574
Holly Cross (KAØVTB) - 247
Ernie Miles (WB2UJL) - 145
Fred Troeh (NØELM) - 24
Gene Chadwick (KØBKZ) - 21

All ASCRA members, whether currently participating in the SETI@home project or not, are invited to join those listed above in the search for E.T. To join the SETI@home project, go to the home page at <http://setiathome.berkeley.edu> and click the link for "Download SETI@home." There are versions of the program available for UNIX, Windows, Macintosh and other kinds of computers. Download and install the appropriate version for your machine. When you run it for the first time, it will set up some basic configuration for you, and you are ready to begin searching for E.T.

To join the ASCRA group, go to the ASCRA group at http://setiathome2.ssl.berkeley.edu/cgi-bin/cgi?cmd=team_lookup&name=ASCRA. If you forget or lose this link, you can also go to the ASCRA web site at <http://www.ascra.org> and click the link for "ASCRA's page for SETI@home." Once you are on our SETI@home page, click the link for "Join" to join ASCRA's SETI@home group.

Why search for E.T.? For the most part, it is a fun, friendly challenge between other individuals and groups. Even though the chances of actually finding E.T. are extremely low, the SETI@home project by itself has many interesting scientific aspects. For example, SETI@home is a prime example of what is becoming known as grid computing. Just like the power grid, in which individual communities can draw power from generating stations elsewhere, the SETI@home project draws computing power from all over the world. This computing model is also being extended to other computation-intensive jobs such as climate prediction, searching for spinning neutron stars and searching for the

causes and cures for cancer. It is also interesting to learn how the project identifies radio signal candidates for E.T. For more information on the science of the SETI@home project, browse through the science links on the SETI@home home page at <http://setiathome.berkeley.edu>. E.T. call home!

73 de kg0ii
Bob Farnham

ASCRA 20-M NET

This is the list of checkins on the ASCRA 20M net from 1/30/05 to 4/24/05 Held 3:30PM CST, Sundays on 14.287 MHz. I think most are correct. Let me know if I goofed.

Ernie, WB2UJL

~~~~~  
WCØB, Bill Bedwell  
NØELM, Fred Troeh  
WØFEN, Robin Cross  
KBØGR, Dave Bland  
WAØIBS, Andy Ferrar  
KGØII, Bob Farnham  
WØSHQ, ASCRA Robin, Operator  
WØVQ, Jim Garner  
NØWZH, Steve Hampton  
KGØXU, Michael Hahn

W1DVM, Dorsey Sanders Jr.

W2TFT, Tom Thatcher  
WB2UJL, Ernie Miles  
VK3AQN, Fred Naylor  
VE3SCP, Scott Price

K4CUO, William Hoskinson  
KF4KCA, Ron Coffman  
AF4JW, Scott Davies  
K4PV, Jim Dunbar

KE5DMW, Weldon Goodnight  
K5ID, Ken Graham  
N5LCL, Dave Gates  
K5RY, Tom Alexander

W6LMJ, Terry Redding  
KB6OJ, Michael Neveaux  
W6RWH, Hale Collins

KL7GNW, Pete Shugar  
KC7NA, Jerry Sugden  
K7NCG, Jim Fish  
KB7UCS, Glenn McMaster  
KI7ZU, David Glower

K8QA, Mike Oiler  
W8QK, Muirl Robinson

K9YV, Steve Fagan  
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HOUSE FIRE—BLESSING AND TEST

Count Your Blessings.

It is a blessing that the fire occurred on Monday, while I was home.

It is a blessing that I woke up.

It is a blessing that no one was hurt.

It is a blessing that the home was not destroyed.

It is a blessing that our home owner's policy will cover our losses.

It is a blessing that I can share these blessings with you during the season when we count it a blessing that God so loved the world that He gave His only begotten Son, that whosoever believeth on Him should not perish, but have everlasting life.

Greeting from Boca Raton, Florida. It is Wednesday, 5:30 AM and I am wide awake at the start of another day. As many of you know, our home sustained a kitchen fire, Monday February 21, that rendered the house unlivable. Thus we will be in temporary housing for the next 60 to 90 days, while our house is put back in order.

The fire originated in the dishwasher. The fire investigator believes a piece of plastic fell on the heating coil, caught fire about 10 PM the night before, smoldered through the night building up heat within the dishwasher to ignite other plastic items, and eventually the heat breached the front of the dishwasher, and set fire to the wooden cabinet next to the dishwasher. However, I believe the timer failed, and the dishwasher heating element remained on, long after it should have turned itself off. The dishwasher had been run at about 9 PM the night before. Its normal cycle is about 45 minutes of washing, and then an hour of drying. Thus, it should have been completely off by about 10:45 PM, Sunday night. Our house was in bed by 9:30 PM. Only I remained up late.

Barbara and I had started the day, waking up at 3 AM Sunday morning, in Fort Worth, Texas. The entire week before we had been on travel. First, personal business in Deland, then an educational conference in Orlando through the middle of the week, and finally a conference on building monolithic domes, held in Fort Worth and Italy, Texas, on Friday and Saturday. We had to get up very early Sunday morning to make the 6:30 AM flight from the Dallas/Forth Worth Airport to Orlando. We drove back from Orlando arriving at about 1:20 PM. The rest of Sunday was busy, I was still catching up on correspondence at midnight, when I finally decided it was necessary to go to bed. I walked through the house, putting the dogs in their kennels, shutting off lights, and remember walking through the kitchen turning off the coffee pot, and noted the red light on the dishwasher was on, indicating it was still in its drying cycle. Waking up early Monday morning when I did was a blessing. I should have been sound asleep.

When I woke, I noticed by the night light that the room was foggy – I thought it was just blurred vision. But then I smelled wood burning and realized the house must be on fire. The fog was actually smoke. I woke Barbara, with the alarming news, telling her to get dressed and out of the house as I started to wake the rest of the house, starting for the bedroom door. We sleep with doors closed, and I first checked the bedroom door to be sure it was not too hot to open. As I opened the door I saw the flames in the kitchen. Our new cabinets were on fire. I started across the family room to the

other bedrooms, but the smoke was too thick and suffocating above the waist – and so I dropped to my knees, and crawled the rest of the way. I woke Sarah Lynn, our seventeen year old, and Nana, Barbara's 83 year old mother – telling them both the house was on fire, to get out, that I was going to call 911. The smoke was so thick I was choking and holding my breath trying to get to the front door. I fumbled with the door-lock, got out, and headed next door. My neighbors were alarmed by my shouts for assistance and for them to call 911. Once I knew they understood I raced back to my house.

I started around to the back, through the side gate and noticed light from the garage. I went in through the utility room and turned on lights yelling for Barbara. Barbara yelled from the back yard that they were all outside. I closed the door to slow the fire and exited back through the garage. I then went to the back yard to see that all were okay, including the two family dogs. Once assured all were okay, I went back to the front yard to guide the fire trucks to our house. With the lights on in the house it was difficult to tell that it was on fire. When the fire trucks arrived I guided the firemen to the front door, explaining the situation and waited for them to put the fire out. Within 20 minutes of the initial call the fire was out. We spent the rest of the morning with the fire investigator, learning the fire started in the dish washer, our home owner insurance carrier, learning we were fully covered, and generally planning what we should do next. Before the day was over we had met with the claims adjuster, the general contractor who would clean up after the fire and start the restoration of the house, the Red Cross whom luckily we didn't need, and our neighbors who all offered help. That first night found us here in Boca Raton in the only hotel in the area that still had space.

A home fire is a tragedy. But for us, with each of us safe, we feel thankful and happily count our blessings. As we think of the sacrifice Jesus made for each of us that we, as believers in Him, might have life eternal, I believe it is important to also count our blessings. We are fortunate to have each other, to live in this country, to be safe, and enjoy the blessings of freedom that we have. So many around the world are less fortunate – indeed, so many here in this place are less fortunate – I believe it is important to count our blessings – especially during this Easter season - for truly we have been blessed.

(-: Terry - W6LMJ



Terry's temporary antenna—a wire less than 10 feet above the ground.

WMD SEMINAR

On March 8th, a friend, fellow HAM, and co-worker, Donita Hilfinger (KCØSWX) and I took a day off of work to attend to a Weapon of Mass Destruction Seminar hosted by the Arapaho County Sheriff Office, Centennial, Colorado. Often whenever I am attending one of these seminars, I wonder if we will be given a lot of strange but possibly true facts. Not this day.

The National Sheriffs' Association (NSA) presented the seminar. The NSA brought in Mike Brown, NSA Program Director, and 3 facilitators: Don Driskall, Rick Keller, and Amy Hall. Each facilitator has a strong background in law enforcement. With strong credentials, I was looking forward to the information they were willing to present.

In this room at the Arapaho Sheriff's Administration Office, there were 8 tables, each seating 6 folks. They fed us breakfast and lunch.(so things were looking up already). A lot of folks Donita and I recognized from our CERT (Community Emergency Response Team) classes. We recognized other HAMs from the area. So it was a day that we would meet more new friends and maintain old ones.

Some of the folks at our work teased the two of us about what we were going to learn. That perhaps we were going to learn how to make a weapon of mass destruction. The only WMD I was concerned about was the baked beans my lovely wife served the family the night before.

We were given a lot of information, including a CD to take home for review. They shared what was Hollywood's viewpoint of how terrorists would make a WMD, with all their labs and technicians making a chemical or biological or nuclear device. Then they shared reality with us.

It is not to take away such a Hollywood scenario. The general public should keep these dangerous weapons in mind. However, it takes millions of dollars to create these WMD, using specialized skills, and obtaining rare elements to create them, possibly more resources than the average terrorist organization could muster. Not to say that a rogue country could not provide such a device to them

The weapon of choice for more terrorist groups is a conventional bomb. An average car can carry 1000 lbs of explosives. Such a device can have an effective range of 125 yards. So each time you read of such an event in the newspaper, see it in the news, or hear it on the radio, terrorist groups are honing their skills with this kind of delivery system. With our highways and railways carrying various hazardous materials, the terrorists do not have to scrounge for WMD resources. All they have to do is look out our windows.

The message the facilitators shared with us is it is not **IF** it will happen, but when. They shared a quote from Osama Bin Laden, "If we attack America's children, we can bring America to its knees." The targets of concern are schools, malls, sport complexes, and theaters.

The grand finale of the day's events was an exercise the facilitator took us through. They had us sit with different folks to avoid too much familiarity. Each table represented a community in which a terrorist attack took place. First it was just a large explosive device detonating downtown. You could tell which tables had either CERT or ICS (Incident Command System) training. Each of us set up a command post and

started setting up an area for a triage. Donita was picked as the Incident Commander at her table, and I was picked at my table. At my table, most of us had either taken CERT or some sort to ICS training. I was picked as IC because I was taking boo-coo notes on the scenario. I think Donita was picked because she has the IC look.

I guess the facilitator thought we had the situation too well in hand, so he added another twist: the bomb had damaged a nearby railway tanker that started to emit a yellow cloud.

As we looked at the map of the area, just about all the tables picked a local college (Arapaho Community College) that was close by for the new Command Post and triage, so we could decontaminate the survivors with the water supply there.

As one of the fascinators approached my table, he said "All of you set up a command post, but you did not pick an Incident Commander."

To which I replied, "If you would have started at our table, you would have" Plainly all of our training was starting to show, as each table indicated that they, too, had an IC.

All in all, it was a GREAT seminar! We were provided with useful information. We were given useful information, with nothing strange. I look forward to more of these seminars!

73, Dave Cook - KCØMHT

LICENSE RENEWAL

I got a reminder from W5YI that my 10 year license term was due to expire in about 4 months and I needed to renew it to avoid problems. The letter also said the FCC no longer sends out notices of the pending expiration of your license.

Reading further there was an offer to renew it for me for \$6.00.

Enclosed was the yellow QUICK FORM 605 application for renewal which can be used only in the final 90 days prior to license expiration. It was not an FCC form "however, the FCC Form 605 can be used to routinely renew or modify your license without charge." Then it mentioned the correct address to send it to the FCC.

On the reverse side of the NCVET QUICK-FORM 605 there was mention of an old address for the FCC web which routed me to:

<http://wireless.fcc.gov/services/amateur/index.html>

There you have the option of selecting "renewing a license" which requires you to use the "Universal Licensing System".

Following this path, you stumble around till you realize you must first get a FRN number and create a password.

Now you are ready to enter the next step for the renewal which searches for your license info and soon you are home.

When you finish you have a file number which you are supposed to keep along with your new FRN numbers and password.

Best thing about taking this path, it is free.

Ernie Miles, WB2UJL

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Send comments, suggestions,
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Editor: Fred Troeh NØELM
4117 Quebec St
Ames, Iowa 50014
e-mail frtroeh@iastate.edu
Phone 515 292-2279

Lamoni Heartland Mission Center
Community of Christ
531 West Main
Lamoni IA 50140

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