Columbia Amateur Radio Association

Newsletter

February, 2001

February is Two–For–One Month at CARA

Ham Auction – Feb. 24

Satellites and APRS/ASTARS – Feb. 27

With Bob Bruninga, WB4APR

This Month at CARA

Feb. 24 – 7:00 PM Bethany UMC.

Feb. 27 – 7:30 PM 4th Floor Lunch Room, Gateway Center

How would you like to have an opportunity to turn some of your unused gear into cash? How about an opportunity to pick up that piece of gear that you've always wanted? Come to the CARA Auction on February 24 and you'll have a chance to do both!

The auction will be held at Bethany United Methodist Church, beginning at 7:00 PM, on Saturday the 24th, and is open to all amateurs. We will charge a 10% fee on all items sold, but you may bid up and buy back anything of your own that does not reach an acceptable price without fee.

Just to whet your appetite, the list of items to be auctioned already includes a Kenwood TS-430, a Kenwood TM–251 2m mobile rig, and several HF Yagi antennas.

APRS, the Automatic Position Reporting System, invented by **Bob Bruninga**, **WB4APR**, is well known for its ability to combine GPS position signals and packet radio into a truly unique and useful tool for hams. Now, Bob has created ASTARS – Amateur radio Satellite Tracking And Reporting System. ASTARS is an amateur radio mobile tracking and communications system for reporting position, status, and messages to and from mobiles in distant locations via amateur satellites using off-the-shelf ham gear. Thanks go to Art, N3OY, for arranging Bob's visit.

On Tuesday, February 27, at 7:30 PM , in the 4th Floor Lunch Room at the Gateway Center in Columbia, you can learn more about ASTARS from its author. To whet your appetite, check out Bob's web site: http://web.usna.navy.mil/~bruninga/astars.html.

From The Prez...

Since you're reading this column, it's likely that you're a dues paying member of CARA. What do you expect from CARA? What do you bring to the club?

At its most basic level, CARA is a kind of public utility, providing wide area two meter and 70 cm repeaters on a 24/7/365 basis. Is that all you want from the club?

Belonging to a public utility isn't all that exciting. We have members who do that for a living! Amateur Radio is an exceptionally diverse hobby and a good radio club should reflect that diversity by giving its members an opportunity to participate in any facet of the hobby that is of interest to them. "How," you ask?

The club should provide access to knowledgeable experts to instruct, experienced 'Elmers' to assist, and funds to support its members in their pursuit of any facet of the hobby.

Take ASTARS, which is the subject of this month's meeting, for example. We're bringing in *the* recognized expert in the area of APRS and ASTARS to explain how it works. The club funds a satellite special interest group, to ensure that you, the members, have access to the kinds of antennas and radios that are used in satellite communications. The leaders of the satellite group are experienced satellite users, who can answer your questions and help you get started. You see, we provide the means, you provide the interest!

Thanks to our hamfest and the prudent management of many boards of trustees, CARA is in a position to support a variety of different special interest groups. We are also blessed with a broad range of experienced members who are willing to share their knowledge and enthusiasm.

Now, you need to tell us what interests you! What do you want to do? What facet of our diverse hobby interests you?

How can CARA support your interests?

How can we get you involved in the club?

There are lots of ways to respond to this request. If you got your newsletter attached to an e–mail, go back to the message, click on the 'Reply' button and type away. Or, come to a club meeting. Or come to a club breakfast. Or, go to the Club Information page, pick a board member, and call them on the phone. Any way you do it, we want your ideas.

Just do it!

Dave Prestel, W8AJR

50 Well Fed People = Pot Luck Success!

Last month, we held our annual Pot Luck dinner at the Bethany United Methodist Church. We had a nice turn–out, with almost 50 folks, members and their families, turning out to share their favorite recipes, to match faces to on–the–air voices, and to shop at our impromptu 'goody store.'

During the course of the evening, Bob, KC3EV, our past President introduced the board for 2001. Bob handed out certificates honoring many members of the club for their contributions to CARA's success in 2000, and passed along the official CARA gavel to Dave, W8AJR, the incoming President. Before, and after, dinner, everyone had a chance to make offers on a variety of antennas, parts, and other ham goodies from the collection of items from the former Amateur Radio Center, which CARA is helping to liquidate.

Thanks go out to Dan, N3LDC, who did his usual fine job in preparing the smoked ham provided by the club, and to Alan, N3AC, for arranging use of the church hall. And, of course, thanks to all of you who came and shared your company with us!

What are you bringing to the auction?

Directions to This Month's Meetings

Bethany United Methodist Church: The church is located on Bethany Lane, approximately 3/4 mile north of the intersection of Bethany and Rt. 40. It is the first church on the right as you head north on Bethany.

Bethany intersects Rt. 40 at the first traffic light west of the Enchanted Forest Shopping Center, and is about 3 miles west of the Rt. 40 West exit from Rt. 29.

Gateway Center: The Columbia Gateway Center is located on Gateway Boulevard, about 3/4 mile south of Rt. 175. It is the *first* building on your left as you head south on Gateway. Gateway Boulevard runs south from Rt. 175 just west of the Rt. 95 exit and just east of Snowden River Parkway.

REMEMBER:

- ✓ ***CARA Auction, February 24**, at 7:00 PM. Bethany United Methodist Church.*
- ✓ ***Satellites and APRS,** with Bob Bruninga, WB4APR, on **February 27**, at 7:30 PM, Gateway Center, 4th Floor.*

{The following article is for those of you who might enjoy tinkering with one of the new ICs on the market, which is used in a clever HF receiver that you can build at home. It is reprinted from ***Electronic Design Magazine****, May 29, 2000 –Ed.}*

A Simple-To-Build Superhet Receiver

by Peter Laughton
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phone: +61 2 42 566186

This idea presents a simple circuit for a superhet radio receiver that can be built up in sections, with each section tested before assembly. The receiver circuitry as presented here can be built for less than $50.

Don't be misled--even though the set has some pretty obvious limitations as presented, it's still capable of world-wide reception when connected to a few meters of wire as an antenna. When constructing a superhet receiver needing just one coil/tuning-capacitor combination, there's the obvious advantage that only one simple coil needs to be made. It also makes the receiver very easy to experiment with by changing the coil dimensions, etc.

In a conventional superhet design, the antenna coil, as well as the oscillator coil, would need simultaneous adjustments. Also, in a conventional set, the tuning capacitor needs at least two gangs, and they must be able to track each other to maintain the sensitivity across the entire reception band.

The receiver is based on the AN602 double-balanced mixer IC, with the big brother of the ZN414 (the 10-transistor radio chip), the ZN416, employed as an IF amplifier, coupled with a standard LM386 audio stage (Fig. 1). Power-supply requirements are 9 to 12 volts dc at 10 mA average (up to 30 mA at full volume).

A good mixer design should be very "strong" (i.e., not easily overloaded by strong stations) and it should have significant conversion gain. It also must have a low noise figure that isn't adversely affected by the oscillator injection power level. The AN602 mixer, designed for use with cellular phones with a frequency response in excess of 500 MHz, takes care of all this. It features an on-board oscillator, capable of up to 200 MHz or so, and provides about 18-dB conversion gain.

The internal oscillator can be disabled and an external oscillator used. Of course, if the external oscillator is employed, a digital frequency readout can also be utilized. The internal oscillator may be reluctant to operate below 1 MHz. So, if coverage of the lower end of the broadcast band is desired, add a 22k resistor from pin 7 to ground. This will increase the bias current, but at the expense of making the noise figure slightly worse. The value of the 220 pF capacitor on pin 7 also can be increased to 1000 pF, but the oscillator may refuse to oscillate on the HF bands if the value is too large (the capacitor can be switched using a wave-change switch if convenient).

The IF stage is based around a ZN416, which is a ZN414 10-transistor radio with an internal 18-db-gain audio buffer amplifier added (Fig. 2). The IC has internal automatic gain control, as well as an AM detector, and works very well at the 455-kHz IF frequency.

The LM386 is almost a standard chip for audio use. The only caution revolves around the 10-µF gain-setting capacitor. If your LM386 seems a bit too lively, lower it to 4.7 µF to reduce the gain. The audio stage runs at full battery voltage and can fill a room with sound using a 6-in. speaker.

The bandpass-filter (BPF) arrangement is quite simple and is based on some junked IF transformers from an old AM/FM clock/radio. One is resonant at 10.7 MHz, while the other is actually the AM oscillator coil. The third position is for direct input, which is particularly useful when operating with a very short antenna. Adding a tuned-RF stage might increase the gain a little, and would tend to reduce broadcast band overload. But, a double-balanced mixer like this is inherently good with respect to signal overloads.

A double-balanced mixer is symmetrical to ground and completely cancels both the received signal and the oscillator voltages in its output. The signal-to-noise ratio also is improved substantially, and the mixer is made more insensitive to pulling. However, in the prototypes, the oscillators did pull slightly when connected to a very long (greater than 100 meters) antenna.

Several prototypes were built, and a strong image response from the IF stage was evidenced as being sensitive to the oscillator frequency plus the IF, and the oscillator frequency minus the IF. An extra IF stage would cure this, but in view of keeping things simple, it was omitted.

It's not a good idea to try and build too small a radio, unless you're experienced. That's because a lot of gain exists in the circuit, and unless the placement of parts is done properly, instability will result. This is manifested by the set exhibiting a very broad response and band capacitance. Detuning effects also became more pronounced. The best form of construction is a piece of 0.1-in. matrix perf board, rather than copper clad. I used low-profile IC sockets in the prototypes without any instability..

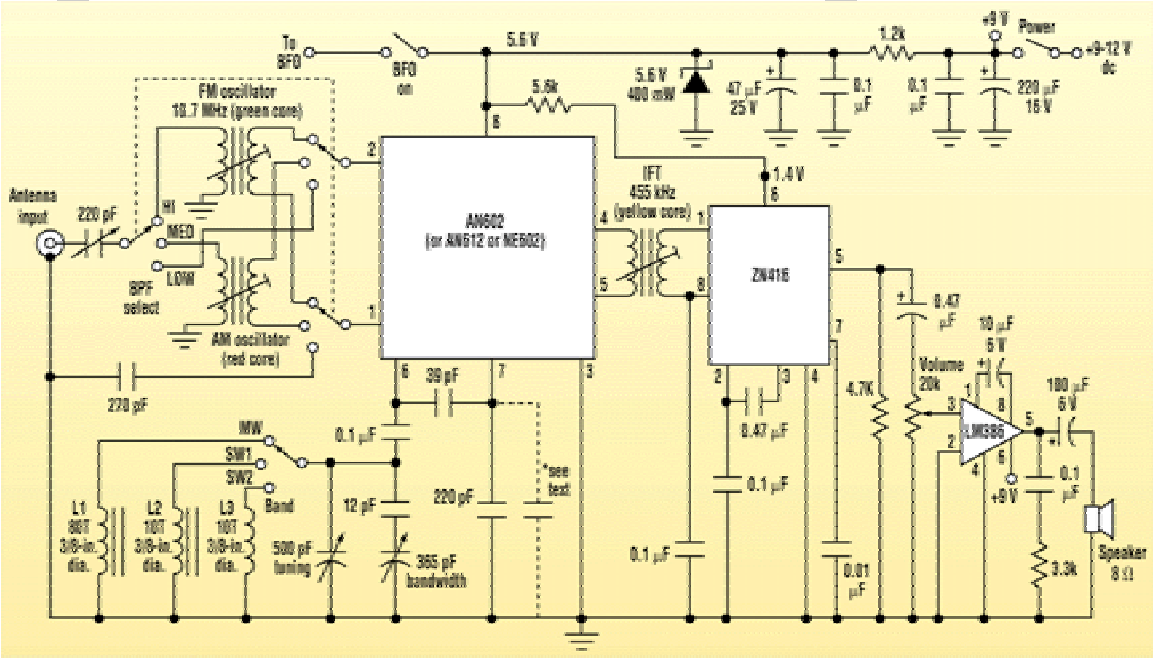
Alignment is very simple. Tune in a station, preferably around 10 MHz (the NIST time station WWV is ideal), and adjust the 10.7-MHz IFT (in the BPF) for maximum volume. The tuning is very broad, so if a peak can't be found, set the core to the center of its travel. Then tune a signal to around 3.5 MHz, and adjust the AM oscillator core (in the BPF) for maximum output. Once again, tuning is very broad and if the core is set in the middle of its travel, all will be well. Finally, tune the 455-kHz IFT for maximum volume on a weak signal on any frequency. The response is broad enough that IFTs probably won't need adjustment from the factory setting. That's it. Pretty simple alignment for a superhet!

In Australia, all of the ICs are available from Radio Spares (RS) components. The AN602 costs about $AU8.00, the ZN416 about $AU6.00 and the LM386 only a few dollars. Component values

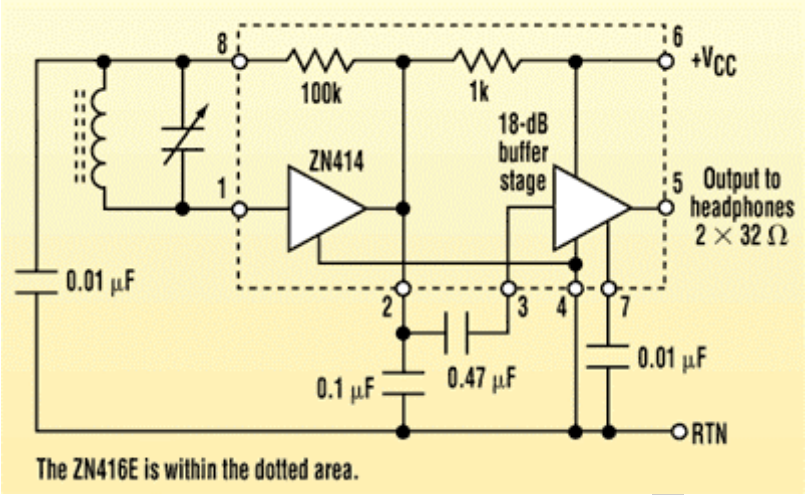
aren't critical, except for the 1.2k and 5.6k resistors in the voltage-dropping stages, and ±50% values won't adversely affect the receiver's performance.

The set will cover all of the HF ham bands, as well as the International Short Wave stations. To enable the reception of SSB signals, two simple designs for the beat frequency oscillator (BFO) are also presented (Figs. 3a and 3b). Both operate at the 455-kHz IF frequency and will only need loose coupling to the IF stage by placing the lead near the ZN416 IC. If the output is still too high, place a resistor of about 4.7k in series with the power supply of the BFO.

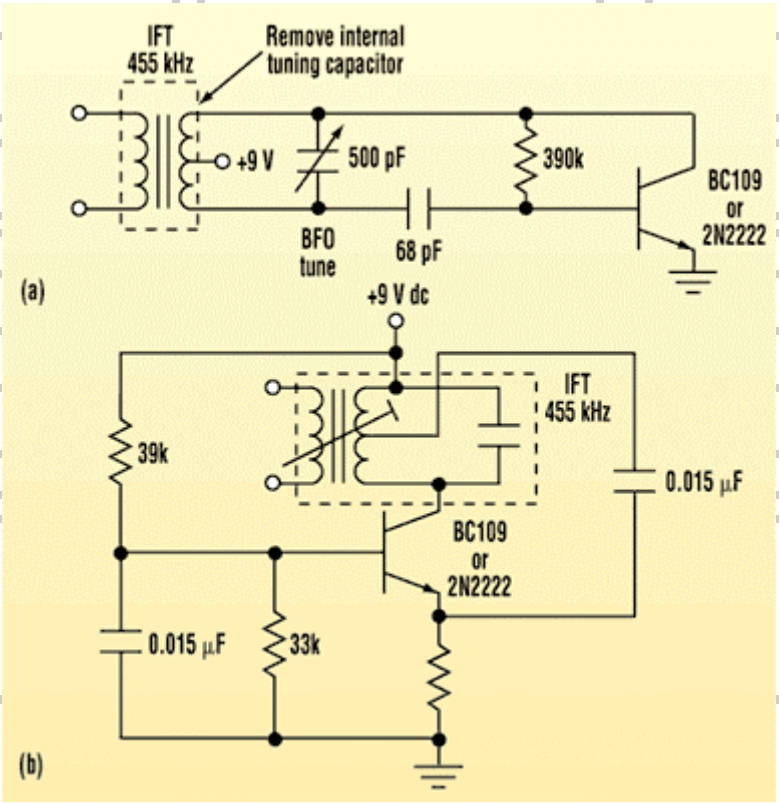
1. This simple superhet receiver is based on the AN602 double-balanced mixer IC, which includes an on-board oscillator.



2. Illustrated here is a block diagram of the ZN416E, which is the "big brother" of the ZN414 (a 10-transistor radio IC).



3. To enable SSB-signal reception, either of these two simple designs for the BFO (beat frequency oscillator) can be used. Both of these designs only require loose coupling to the IF stage, which is done by placing the lead near the ZN416 IC.



Club Information

Repeaters (K3CUJ)

147.135 / R+ Net repeater. CTCSS: **156.7 Hz**

147.39 / R+ Open autopatch ("*" to activate, "#" to clear) and direct dial 911

448.275 / R– CTCSS: **156.7 Hz**

449.475 / R– CTCSS: **156.7 Hz**

Mailing Addresses

Club Business	**Newsletter**
CARA	**c/o Dave Prestel W8AJR**
P.O. Box 911	**10160 Tanfield Court**
Columbia, MD 21044-091	**Ellicott City, MD 21042-5808**
CARA@QSL.net	dprestel@home.com

Activities

Club meeting: the fourth Tuesday of the month at 7:30 p.m. , Room 401, Gateway Center, on Columbia Gateway Drive, off of Rt. 175, near I–95. Monitor 147.135/R– for directions.

On-the-air net: 147.135/R– at 8:30 p.m. each Tuesday except for meeting night.

On-the-air RACES / ARES net: 147.135/R– at 7:30 p.m. on the 1st and 3rd Tuesdays each month.

On-the-air RACES exercise: 147.135/R– at 7:30 p.m. on the 2nd Tuesday each month.

CARA breakfast: 9:00 a.m. on the second Saturday of each month, at Jilly's Restaurant in the Enchanted Forest Shopping Center. If you wish to attend, contact Bob Scarburgh, KC3EV, 410 465-2421.

Executive board meeting: Held monthly, one half hour before the regular meeting. All members are welcome.

CARA on the World Wide Web: Visit us at http://www.qsl.net/cara/ for the latest "hot tips" and electronic edition of the newsletter.

Officers and Chairpersons

Officers:

President	Dave Prestel	W8AJR	H: 410-203-9432	dprestel@home.com
Vice-president	John King	KB3WK	H: 410-465-6324	kb3wk@arrl.net
Secretary	Dan Goulette	N3LDC	H: 410-796-2587	danjanis@connext.net
Treasurer	John Pinkston	W3GJN	H: 410-531-3450	jpinksto@erols.com
Member-at-large	Tim Titus	W1TRT	H: 410-730-8420	w1trt@aol.com
Past President	Bob Scarburgh	KC3EV	H: 410-465-2421	rscarburgh@aol.com
License Trustee	Alan Chedester	N3AC	H: 301-596-6543	alanc1@juno.com

Committee Chairpersons:

'Elmers'	John Pinkston	W3GJN	H: 410-531-3450	jpinksto@erols.com
Field Day	Alan Chedester	N3AC	H: 301-596-6543	alanc1@juno.com
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Social	*Vacant*			
Quartermaster	*Vacant*			
Technical	Art Goldman	N3OY	H: 410-997-3838	artg@home.com
T-MARC Rep	Dave Prestel	W8AJR	H: 410-203-9432	dprestel@home.com
VE Testing	Bob Scarburgh	KC3EV	H: 410-465-2421	rscarburgh@aol.com
Youth Education	Dave Anderson	WA3WZX	H: 410-465-8557	dranderson@juno.com
Youth Group	*Vacant*			

ARES / RACES:

ARES	Ed Wallace	K3EF	H: 410-465-0042	k3ef@home.com
RACES	Mike Carr	WA1QAA	H: 410-799-0403	bamcc@erols.com

February, 2001 Calendar of Events

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
				1	2	3
4	5	6 ARES / RACES Net	7	8	9	10 Breakfast at Jilly's Restaurant
11	12	13 RACES COMEX	14	15	16	17
18	19	20	21	22	23	24 CARA Auction
25	26	27 CARA meeting	28			

Dates to Remember:
February 24: CARA Auction at Bethany United Methodist Church, 7:00 PM
February 27: CARA Meeting: APRS and Satellites with Bob Bruninga, WB4APR

March, 2001 Calendar of Events

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
				1	2	3
4	5	6 ARES / RACES Net CARA net	7	8	9	10 Breakfast at Jilly's Restaurant
11	12	13 RACES COMEX	14	15	16	17 **Laurel VE3**
18	19	20 ARES / RACES Net	21	22	23	24
25 **Winterfest Vienna, VA**	26	27 CARA meeting	28	29	30	31 **Baltimore Hamboree, Timonium**

Dates to Remember:
March 27: CARA Meeting