March 1995

LUDLINE

What the heck is G-TOR?

by Bruce Roberts, KA2HRM

Recent years have yielded one exciting digital communications adventure after another. No , just as we are accepting PACTOR and CLOVER, G-TOR appears. G-TOR "waits" after the end of its data frame for the start of the acknowledgment, to allow for propagation delay over an HF path. It accomplishes changeover in the data-flow direction by extending the acknowledgment bytes into a special frame.

Changeover then occurs when the other station acknowledges. Link quality determines link speed, but G-TOR performance enhancements over HF channels include forward error correction (FEC), interleaving, and redundancy.

Does this sound like the digital mode of the future? I think its chances are excellent.

G-TOR uses an extended version of the GOLAY Code (23,12,3). Prior to transmission, as an example, the system divides 300-baud frames into forty-eight 12-bit words and matches them with forty-eight 12-bit error-correction words. The system then interleaves the entire 72-byte data frame bit by bit-resulting in 12 "bins" of 48 bits-and transmits it.

The receiving station reverses the process, and checks for proper cyclic redundancy codes (CRCs). If the frame contains an error, the receiving station requests that the transmitting station send a matching parity frame. If still unsuccessful the cycle begins anew.

The dispersal of noise-burst errors via interleaving and the power of the GOLAY code to correct 3 bits in every 24 usually result in recovery of error-free frames. No one who has listened to the chirping of AMTOR signals, the weird roar of packet, or the cyclic sound of PACTOR will find the audible noise of G-TOR surprising. What happens is that the transmitting station codes the data before sending it. The receiving station then adds received data according to the code. The receiving system checks every line for the same total. Whenever the receiving station detects an error, it tells the transmitting station to "do it again." This makes the mode fast, and allows the system to seek the optimum baud rate, in a way similar to PACTOR.

During tests in January of 1994, over a million bytes were transferred error-free from Lawrence, Kansas to Laguna Nigel, California over HF. A trace function on at each station allowed display of acknowledgment bytes and data frames, including control bytes. Thus, the operators could view and count the data and acknowledge frames without the aid of forward error correction and interleaving.

The results were surprising. While PACTOR's transmission speed often dropped from 200 to 100 baud, G-TOR nearly always kept on crunching frames at 300 baud, despite interference and mild multi-path conditions. Transfer time for the one-megabyte test varied from 12 to 17 minutes on PACTOR, vs. 5.5 to 7.5 minutes for all but one transfer in G-TOR. Does this sound like the digital mode of the future? I think its chances are excellent.

KAM now includes G-TOR mode as standard in the KAM-Plus and the in the KAM enhancement board. The company also offers firmware EPROM updates for both, and the update packages include a G-TOR manual. G-TOR is not available for KAMs without the enhancement board because they lack sufficient EPROM capacity.

from the Troy ARA (Troy, N.Y.) "TARA News"

CARC dues are renewed in March. The current dues are $9 US. Please make it easier for the Treasurer (and yourself) by bringing a **CHECK** for $9, made out to: *CARC*. Put your callsign on the memo line for tracking purposes.

inside...

f rom the August '94 Austin (Texas) ARC "AARC Over"-Steve Means, N5PSW, Editor

Field Day as living history.

by Wayne Thalls, KB6KN

Field Day is fun for a lot of hams. But how man realize that their Field Day activities also keep some of Amateur Radio's essential traditions alive?

Early in this century, hamming was primitive. Most hams relied on batteries and built their gear in true breadboard style- exposed components and wires mounted on a wooden base. And if a part was unavailable, they found or made a substitute. Hams modified their gear continually, so it always had an unfinished look. And that ability to improvise was the very skill which got so many hams into emergency communications.

Until the mid-1930's, telegraph and telephone provided the primary communications links between communities. Few localities had radio systems, even for their police, and even those had one-way systems. So storms and other natural disasters often isolated communities.

Hams to the rescue! In 1913, QST reported one of the first involvements of Amateur Radio in a disaster. When a windstorm wiped out wire communications over a large area of the Midwest, hams at Michigan and Ohio State universities, among others, provided the only communications. Throughout the 1920's, following tornadoes, snowstorms, train wrecks, plane crashes, and floods, hams helped whenever public communications failed. And the hams showed a wonderful ability to adapt rapidly.

One 1925 event captured great public attention. After spelunker Floyd Collins became trapped in a Kentucky cavern, hams set up a 10-watt CW transmitter powered by 500-volt dry batteries at the rescue site. Fourteen miles away, at the Cave City telegraph office, another ham copied news from the cave. That ham link gave the whole world the news.

Both the Army and Navy understood the benefits radio operators could provide during disasters, and they recruited hams for their practical experience a radio operators .

Proven performers. As military and commercial radio grew, so did demand for spectrum. In 1929, the FCC issued a form to be completed by every Amateur, requiring them to explain why their operation was in the public interest, convenience, or necessity. But the ARRL soon convinced the commission that hams had already shown their services to be indispensable to the public interest. The FCC abandoned the form.

A major 1931 earthquake in New Zealand sparked efforts to strengthen and formalize Amateur emergency preparedness. After the 1933 Long Beach, California earthquake focused even greater interest on U.S. hams, QST began pushing disaster preparedness. The first ARRL-sponsored Field Day, in 1933, became an international event, with some 50 stations participating. In following years, as new rules encouraged using low power and emergency power sources, participation grew rapidly. In 1935, QST announced the formation of the Emergency Corps, and urged "every red-blooded ham" to join.

Government agencies and relief organizations like the American Red Cross soon realized auxiliary communications were essential, so ARES and RACES evolved. Today, the emphasis in emergency communications is on hams operating in groups, rather than solo, and compact VHF and UHF gear has replaced HF. But the need for ham volunteers continues.

from the September '94 San Lorenzo Valley (Calif.) Repeater Club *Downlink*- Leon Fletcher, KM6ZG, Editor

Tiny loop antennas: do they really work?

By Chip Margelli, K7JA

In my travels, I often encounter old friends who are now retired. They say something like, "Chip, I'd love to get on the air, but I can't put up a tower at my town house." If code restrictions aren't the problem, physical ones can be. (When was the last time you scampered up a tower?)

Magnetic antennas: We've all seen ads for compact loop antennas so-called "magnetic antennas." Perhaps you've mentally classified them as "dummy loads in the sky." After all, how can anything that small work? And, even if it does, I must be limited to working locals, right?

À magnetic antenna comprises a loop three to ten feet in diameter resonated by a capacitor and fed by a smaller coupling loop. The radiation resistance is so low you must measure it in milli-ohms. So efficient loops have extremely high "Q"- and resulting bandwidth as narrow as 10 KHz on 20 meters.

Yet a good magnetic antenna can provide pleasant surprises. It can be almost as efficient as a dipole, and you can mount it vertically and rotate it to null out noise. The narrow bandwidth means it acts as a narrow bandpass filter, so it protects your receiver from overload on strong signals. On transmit, the same filtering provides a high degree of harmonic suppression, reducing the risk of television interference.

Performance: I recently had an opportunity to compare such an antenna with the monoband beams atop my 70-foot tower. I mounted the loop on a 10-foot stick lashed to my chimney. Signals on the loop were only 10 to 12 dB below those of my monobanders on 10 and 20 meters. And those beams play well, so this is respectable performance. On the other end, when my signal from the beam was S9 plus 20 dB, I was still S9 plus 10 dB on the loop. Several DX stations answered my first call, and the 599 report I received ed from a rare DX station when using the tiny antenna gave me quite a thrill

Low cost: The cost of a loop is a tenth that of a tower, concrete base, guy wires, guy anchors, rotator and rotor cables, high-strength mast, and beams. And you don' need a building permit, professional engineering services, or an erection crew.

An excellent article on compact loop antennas by John Belrose, VE2CV, appeared in the November, 1993 QST. A review of manufacturers' specifications can also help you understand how magnetic a antennas work. But when reading a performance specification sheet, keep in mind that, as with mobile HF antennas, a wide bandwidth can indicate inefficiency.

Tuning: Because a magnetic antenna's bandwidth is so narrow, you'll be retuning almost every time you QSY. So take a good look at how handy its tuning unit is to operate. Magnetic antennas can work effectively in an attic, away from prying eyes, and they are unbeatable for portable or emergency communications work. If you think you can't work DX because you can't put up a tower, you might consider a getting magnetic antenna; it can put you

Jack Culliton, N2LBZ, Chief Editor. The author credits "an article be G3KFN and KC6IKO."

A most dangerous radio.

by Huck Huckabe , AA5BU

In the 1930s the merchant marines of Great Britain and the United States dominated the world. And I, as a teenager, wanted to become a ship's radio operator. So I learned to be a Morse operator. Many of my friends did likewise.

Marine radio gear, then as now, was usually the minimum that met legal requirements. Most ships had a simple crystal-controlled CW transmitter and a two- or three-tube receiver. The National SW-3 (a collector's piece today) was typical-with a regenerative detector and on or two stages of audio amplification. A CW signal requires some type of "beat oscillator" to produce an audible tone.

Those regenerative detectors oscillated to produce the tone. The oscillation power was a fraction of a watt, but with the world's best ground and no isolation from the ship's antenna, that QRP signal could be detected at a distance. German submarine torpedoes sent about three-fourths of the U.S. merchant fleet to the bottom. The British fleet suffered even higher losses.

One of y friends survived two sinkings by "U-boats." Another survived the sinking of five small freighters. How did the Germans find the ships? The U-boats would surface at night and listen for the signal of one of those radios. Finding one, they could trail he ship- sometimes a member of a convoy. They radioed the ship's location and course to other U-boats, who converged to form a line ahead to ambush the convoy.

It took a long time for our side to learn how the Germans located our ships. After the discovery , our orders for "radio silence" specified that both our transmitter and receiver were to be off. But until then, that cheap little radio led to the death of many ships and their seamen. Yet it was only doing what it was designed to do - oscillate.

AUCTION Set for March meeting.

Start scouring the attic, basement and garage for eee-lek-tronic dee-vices that will make good fodder for the auctioneer's cannon.

CARC Minutes - February

Meeting called to order at 7:37 p.m., by Bob, KB9MS.

Treasurer's Report - Will, K4IWW,

Savings:	$2,837.96
Checking:	$ 828.31
Cash:	$ 40.00
Total:	$3,706.27

Piedmont-Coastal Repeater Network (PCRN) - Ed, AB4S, new repeater in Thomasville. Mike, WB4TQD, put a macro in the 146.88 MHZ controller to handle 3 tones for SKYWARN (2 tones are normally used).

Wake Digital Communications Group (WDCG) - RNC had receiver problems. RNCLAN is back in service. No Raleigh location, yet. Still looking.

Amateur Radio Emergency Service (ARES) - 1. An information meeting at the Apex Command Post on 2/27. 2. Practice for the test on 3/14, 1600 to 2000. 3. THE REAL SHEARON HARRIS NUCLEAR PLANT EXERCISE is TUE., 4/18. CARC members are encouraged to take part in that test. Please put 4/18 on your calendar!

Old Business:
John, N1GMV, suggested a contest for a CARC logo to be use on the proposed CARC business card. Make your design big and bring it to the March meeting for displaying and judging.

New Business:
Field Day - Mike, AC4TG, to be Czar. Which site to use? McGregor Park was good. Others? FD: 6/24-25. Please put those dates on your calendar.

SWAPFEST
Jim, N4RSE, SWAPFEST Czar. Find a place for exams - Jack, WA4OOD. Prizes - Mike, AC4TG. Prize allocation $1,500. Tailgating - Dave, N4ELM and John, KE4IZX. Flyer for Charlotte - Jerry, KE4TTS. Other tasks will be falling into place. Remember: CARC is the host for this 'fest. That means we do the work and the attendees, we hope, enjoy it. When you go to some other club's 'fest, you enjoy it and they do the work. The MID-SUMMER SWAPFEST is our chance to put on an enjoyable event for our guests. It can be done, but it takes everyone's participation.

The program was an informal Q&A about Amateur Radio.

n4ue

Fuses and breakers protect you and your gear (author unknown)

Fuses protect equipment and users from the effects of excessive electrical current - heating that can set fires. Fuses contain a link that melts when current exceeds their rating. The cause of excess current can be a malfunction or a user trying to connect too many loads.

A fuse is not repairable; it must be replaced. Fuses deteriorate over extended use. Thus the advice: "If a fuse blows, try another of the same rating; if the replacement blows, find the problem and fix it." Never replace a fuse with one whose current rating is higher. Fuses can be of the fast-blow or slow-blow type. Slow-blow fuses are for circuit that must withstand a current surge, such as when a motor starts.

Some automobiles use "fusible links." A fusible link looks like a wire, but it's really a fuse. As with a fuse, always replace it with another of the same rating. Cartridge fuses are another type. Though larger, they work like other fuses.

In electronic equipment, you may encounter a "pigtail fuse"-a standard fuse with lead wires welded on-for soldering into a circuit. You can remove a pigtail fuse and solder in a new one, or use special clips to attach its replacement.

The circuit breaker is another type of over-current protector. Circuit breakers are more expensive than fuses, but have the advantage that they only "trip," rather than being destroyed by excessive current. A common household breaker has a handle that flies to its center position when the breaker trips. A breaker can double as a power switch. Like fuses, circuit breakers should not be replaced with higher-rated units.

from the November '92 "Ole Virginia Hams ARC, "Ole Virginia Times."

Cary Amateur Radio Club

The Cary Amateur Radio Club meets on the fourth Thursday of the month, 7:30 p.m. in the lower level of the Christian Life Center of White Plains United Methodist Church. The June, November, and December meetings are held off-site. Call for location of those meetings. **Next Meeting: March 23rd.**

1995 Officers

KB9MS	Bob Lukaszewski	833-0199	President
KB4LFH	Mike Crowder	319-9556	Vice-President
K4IWW	Will Harper	467-0224	Treasurer
N4UE	Herb Lacey	467-9608	Secretary

Feedline

Feedline is a member-supported publication of the Cary Amateur Radio Club and is published monthly. Deadline for submissions is the second Thursday of the month.

Editor: Tom Klimala, KM4LB
1545 Seabrook Avenue
Cary, North Carolina 27511

Dear Editor,

I thought I was a member of the CARC, but this month my label reads (05) instead of the usual (MBR). What does that stand for?

sincerely, (05)

Dear (05),

First let me thank you for supporting the CARC in the past as an active member. Your continued interest in our club will allow it to serve the amateur community as it has for over 23 years.

The reason your label reads (05) is because our $9.00 annual membership fee is due in March. After we receive your renewal, your status will be reset to (MBR).

The (05) indicates that the May Feedline will be the last complimentary copy that you will receive should you choose not to renew your membership.

Visitors to our meetings, *who are not on this month's mailing list,* will receive three copies of the Feedline following their visit. This is a one-time entitlement and cannot be renewed by attending a meeting later in the year.

Feedline

Cary Amateur Radio Club
Post Office Box 53
Cary, North Carolina 27512

inside...

Mini-loop antennas - a report on their utility and performance.