GETTING STARTED

AGC: What Does It Mean?

by *John Dorsey*

This writing deals with Automatic Gain Control and Dynamic Range. Let's see if we can explain something technical without sounding like we swallowed an electronics dictionary!

I have an old military radio (AN-SRR 13) *that has* an on-off switch in the AGC circuit. I'm amazed at how much even a strong signal will vary in strength when I switch off the AGC action. Naturally, we can't manually vary the RF Gain every time the signal strength changes. Within limits, the AGC circuits do it for us. When related to shortwave receivers, AGC and AVC, Automatic Volume Control, are essentially the same thing.

The way these circuits work is to extract some signal voltage from the detector and use it to control the receiver's amplification. The amplification runs wide open at minimum AGC voltage, then cuts down as this voltage rises due to an increase in signal strength. When an extremely strong signal is present we've got problems, the worst of which is very distorted audio.

If you visualize the block diagram of a receiver, you'll see that AGC action occurs "after-the-fact," meaning that a low-level stage could be overloaded before the high-level voltage builds up enough to remedy the problem, a condition known as overshoot.

The brain of AGC is a capacitor which is charged by the voltage derived from incoming signal. The resistors around this capacitor determine how fast this action starts and stops. If we run enough RF Gain to insure noise-free reception, we can eliminate a lot of fading, the more voltage stored in the AGC capacitor, the longer it will take to discharge so amplification can begin again.

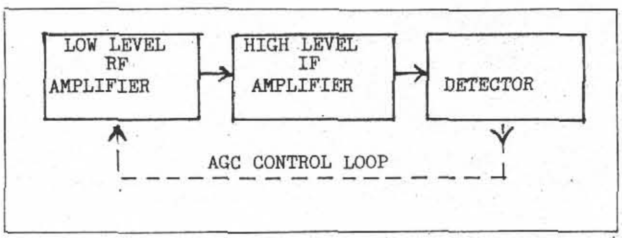
DYNAMIC RANGE

Take a close look at an S-meter. It's displaying two different measurements of signal strength: S-units and decibels (dB). Let's convert it to all S-units. 40dB = S100, 60dB = S1000 and 80dB = S10,000.

On a clear day, a weak *signal is workable at two*-tenths of a microvolt. The other extreme is when VOA in Greenville, NC lights off one of their 500 kW rigs and *dumps at least half of that* on my antenna! Let's guess two milivolts. We've just shown an 80dB variation in signal strength. I don't care how good a manufacturer is at designing circuits, he can't overcome the fact that electronic law simply won't allow that much range in AGC circuits. An AGC capacitor that would hold that much voltage would take too long a time to ever get off the circuit. That's why even the top sets have an RF Gain control, and are still subject to overloading.

Add to the extreme variation of signal strength the problem of designing circuitry to track the speed of that change. Most signals will vary peak to null in a few seconds and AGC action is timed accordingly. What happens when the signal dances in and out like airplane flutter bouncing a TV picture? We watch our meter jump back and forth and listen to our set "pump."

Some day a manufacturer is going to come out with micro-processor-controlled AGC which will change time constants to stabilize rapidly-fluctuating signals as well as switch out sensitive low-level stages when a very strong signal is present. But until this set hits the market, we'll just have to stand by with a coathanger for our alternate antenna!



50 OR 75 OHM CABLE: WHICH IS BEST?

Years ago it was determined that antenna systems were more efficient when fed through coaxial cable with similar electrical characteristics.

As an antenna radiates its signal into space, it encounters a certain "resistance," more commonly termed "impedance." Coaxial cable is available in matching impedances of 50 and 75 ohms, corresponding to ground plane and dipole antennas.

For high power transmitters, correct matching between the transmitter and *transmission line is important* to avoid power losses which may become destructive voltages and heat.

For receiving purposes, *impedance matching is far* less important. While a nominal 50 ohm impedance is declared for shortwave and scanning receivers, no receiver *made actually main*tains a 50 ohm impedance over its entire tuning range. A scanner's impedance may run from 30-90 ohms or so!

Similarly, no antenna is capable of representing a perfect 50 ohm impedance over its entire range as called upon by wide-frequency-coverage receivers. Specifying 50 ohm cable solely on a basis of matching frequency-agile receivers is meaningless.

All important, however, is "signal attenuation," the absorptive affect that coaxial cable has for radio signals traveling from one end to the other.

Weak signals may be totally lost by the time they traverse the length of the line from the antenna to the receiver. And the higher the frequency, the greater the attenuation.

The truth of the matter is that 75 ohm cable typically has lower attenuation than 50 ohm cable; that is *why Grove Enterprises sells* RG-6/U rather than RG-8/U. Not only does it work better, but it is smaller, easier to handle and considerably *less expensive*. And it has 100% shielding, making it immune to intrusion by electrical interference.

Next time someone tells you that 75 ohm coax won't work as well as 50 ohm coax on his receiver, inform him of the facts!

Logging 170 Meters

by Craig Healy, Editor "Top End Yearbook" (66 Cove St., Pawtucket, RI 02861)

1600-1800 kHz LOGGINGS

1615	Ohura, NEW ZEALAND, OR beacon
1629	Australia, MI161 or Z161 mixing w/2RPH
1637	KA80100 vry fast code
1685	Mercaderes, Colombia
1689	Mt. Hagen, Papua, NEW GUINEA
1707	2WJ and dash for 30 secs every 4 min
1740	KA5223 fast code
1782	30 pip/min

LOGGING CREDITS: Art Peterson (CA), and Craig Healy (RI)

TEN TARGET STATIONS ON 175 METERS

1610	ANGUILLA The Caribbean Beacon is heard all over North America. Should be the easiest 175 meter station to hear.
1613	GUATEMALA Rabinal RAB beacon is heard everywhere.
1685	COLOMBIA Mercaderes MER beacon is also widely heard
1675	ECUADOR Esmeraldes ESM beacon. Harder than MER but not too tough.
1615	NEW ZEALAND Ohura OR beacon. Only a West Coast target. Can be heard east of the Rockies, but don't bet the rent on it.
1709.5	Decca HiFix station. Sounds like the Morse code letter "J", with the first dit at a slightly lower frequency. Fairly easy.
1746	Another Decca station like above. Not as strong, though
1747	Another Decca. As good as 1709.5 usually. Someday we'll find out where these things are.
1668	BELIZE 2nd harmonic of 834 kHz. This is heard up into Canada.
1635/ 1637	This last target isn't a station, but rather a group of them. These are heard all over the country with various calls/ times. There is something for everybody here.