

The Modulator

February 2007 Vol. 61, No. 02

Newsletter of the Baltimore Amateur Radio Club



BARC Minifest 2007

Also:

- Morse Code Testing to end February 23
- The Stories of the Frequencies, Part II
- New Amateur Radio Bill introduced in Annapolis

The MODULATOR

published by *The Baltimore Amateur Radio Club*

P.O. Box 120

Reisterstown, MD 21136

For Information, dial **410-HAM-TALK**

Club website: <http://www.baltarc.com>

Hamboree website: <http://www.gbhc.org>

Staff

Editor	Doug Wittich	N3VEJ	410-256-0257
Graphic Artist/Production Mgr.	Tom Henry	KB3JQP at arrl.net	410-882-6461

Club Officers

President	Joe Krysztoforski	AJ3X
Vice President	Ed Kriston	K3CAV
Treasurer	William Dobson	N3WD
Secretary	Mark Franz	KB3NGI
Members at Large	Hale Adams	N3NYC
	Myles Carpeneto	K3VTT
	Phil Hebert	N3CDY

Committee Chairmen

Public Information	Doug Wittich	N3VEJ at arrl.net	
Hamboree	Robin Schaefer	AA3SB at arrl.net	410-247-0578
Repeater	Phil Hebert	N3CDY at comcast.net	
License Testing	Rusty Schaefer	N3WKE at arrl.net	410-247-0578
W3FT Trustee	Doug Wittich	N3VEJ at arrl.net	
Membership	Hale Adams	N3NYC	
Legislative Affairs Team	Tom Coates	N3IJ at comcast.net	410-933-9344
Programs	Tom Coates	N3IJ at comcast.net	

Items for *The Modulator* should be sent by the 5th of the previous month, to:

Editor
The Modulator, 3607 Klausmier Rd
Baltimore, MD 21236
or email to *modulator at baltarc.com*.

The club meets at 7:30 pm. the first and third Wednesday of every month in the club facility at 12360 Owings Mills Blvd., 3/10 mile south of Bond Ave. See ADC map page 16-D8. Complete directions web page <http://www.baltarc.com/directions.htm> or call the Club Facility at 410-526-4263.

VE Testing: First weekend of each month. Contact Rusty, N3WKE at arrl.net

Copyright 2007, Baltimore Amateur Radio Club, Inc. All Rights Reserved

Table of Contents

New Amateur Radio Bill Introduced by Sen. Kathy Klausmeier
(could you say thank you?)..... 4

Morse Code Testing to End.....4

Equipment Review - Icom 746 Pro6

Skywarn - Anne Arundel County, MD.....7

The Technical Stories of the Frequencies (Part 2).....9

For Sale18

VE Report - January 2007.....19

BARC Minifest 2007 *Highlights*



Atlantic Caterers had quite a line for the crab soup and jumbo hot dogs at the minifest.

On the Cover: Chet Whitekettle, K3AJU (left), longtime BARC member, chatting while tending his table at the minifest.

New Amateur Radio Bill Introduced by Sen. Kathy Klausmeier *(could you say thank you?)*

The bill can be seen here:

<http://mlis.state.md.us/2007RS/billfile/sb0068.htm>

Background is at <http://n3ij.home.comcast.net/maryland.html>

HOAs created after the effective date could have a visible emergency communicator. As you know, at present if you reveal yourself as a ham, you risk being required to remove all outside antennas (if that's required by the rules or covenants of your community). The bill would remove that risk in newly-organized HOAs.

Residents of HOAs created after the effective date of the bill would not have to worry about hiding their Amateur Radio activities from the neighbors, which should improve recruitment and retention. The three-year decline in ham licenses might reverse. We could start to grow again.

Sen. Kathy introduced a similar bill last year. She has been a staunch friend of Amateur Radio. All you need to do is to call 1-800-492-7122, ext. 3620 (toll free) or send an e-mail to katherine.klausmeier@senate.state.md.us. A long message is not needed. Just say "Thank you for introducing SB 68." and give your name and address, so she can tell you're a constituent.

If you know other hams in the 8th district (basically 21236, 21234 and 21228) please forward this to them.



Tnx & 73
Tom, N3IJ

Morse Code Testing to End

From ARRL Bulletin:

Codeless Amateur Radio Testing Regime Appears Set to Begin February 23

NEWINGTON, CT, Jan 19, 2007—The ARRL has learned that the FCC's Report and Order (R&O) in the "Morse code proceeding," WT Docket 05-235, is scheduled to appear in the Federal Register Wednesday, January 24. Assuming that occurs, the new Part 97 rules deleting the requirement that Amateur Radio license applicants pass a Morse code examination for any license class would go into effect Friday, February 23, 2007. The League cautions that

this date is tentative, pending official confirmation and publication.

“This change eliminates an unnecessary regulatory burden that may discourage current Amateur Radio operators from advancing their skills and participating more fully in the benefits of Amateur Radio,” the FCC remarked in the Morse code R&O.

Publication of the R&O in the Federal Register starts a 30-day countdown for the new rules to go on the books. The FCC reportedly completed its work on the R&O this week and forwarded it to the Federal Register receiving desk. The Federal Register must make the document available for public inspection 24 hours prior to publication. Federal Register personnel are constrained by law from saying if a particular R&O is in the publication queue, however. Rules and regulations that appear in the Federal Register constitute their official version.

Deletion of the Morse requirement is a landmark in Amateur Radio history. Until 1991, when a code examination was dropped from the requirements to obtain a Technician ticket, all prospective radio amateurs had to pass a Morse test. Once the new rules are in place, Amateur Radio license applicants no longer will have to demonstrate Morse code proficiency at any level to gain access to the HF bands.

On or after the effective date of the new rules, an applicant holding a valid Certificate of Successful Completion of Examination (CSCE) for a higher license class will be able to redeem it for an upgrade. For example, a Technician licensee holding a valid CSCE for Element 3 (General) could apply at a VEC exam session, pay the application fee—which most VECs charge—and receive an instant upgrade. A CSCE is good only for 365 days from the date of issuance. Candidates for General or Amateur Extra between now and the effective date of the new rules still must have Element 1 (5 WPM Morse code) credit to obtain new privileges, however.

The new rules also mean that all Technician licensees, whether or not they've passed a Morse code examination, will gain HF privileges identical to those of current Novice and Tech Plus (or Technician with Element 1 credit) licensees without having to apply for an upgrade. Novices and Technicians with Element 1 credit have limited privileges on 80, 40, 15 and 10 meters.

The FCC R&O includes an Order on Reconsideration in WT Docket 04-140—the so-called “omnibus” proceeding. It will modify the Amateur Service rules in response to ARRL's request to accommodate automatically controlled

narrowband digital stations on 80 meters in the wake of other rule changes that were effective last December 15. The Commission designated 3585 to 3600 kHz for such operations, although that segment will remain available for CW, RTTY and data.

The ARRL has been posting all relevant information on these important Part 97 rule revisions on its “FCC’s Morse Code Report and Order WT Docket 05-235” Web page.



Equipment Review - Icom 746 Pro

Joe Tracey, KB3LNM

I have been using an ICOM 746PRO for 2 years now and in general am very pleased with the performance. It covers 160 meters to 2 meters with 100 watts SSB, 40 watts AM. It has DSP filter processing on all bands. I have used the receive filtering extensively on 2 meters where the 15 KHz, 10 KHz and 7 KHz filter bandwidths have been helpful with weak signals.

I did have a problem recently that is apparently a common problem for these radios. The display is an LCD that is backlit with a florescent tube. The power for the florescent lamp comes from an oscillator fed by DC through a series voltage regulator transistor. The series regulator is used to adjust the DC voltage to the oscillator to change the backlight intensity. When the display backlight is run at less than full intensity the voltage drop across the voltage regulator is dissipated in heat resulting in premature failure. There is no heat sink used and when inspecting the board there was discoloration indicating a heat issue.

The repair is difficult because the board is directly behind the front panel requiring a significant amount of disassembly. The transistor is surface mounted and the transistor is up against the side of a metal shield. I was able to repair my transceiver, but took two attempts to correctly solder the transistor.

This failure can be avoided by running the display at full backlight intensity. It comes preset at 50% from the factory.





Skywarn - Anne Arundel County, MD

William E. Smith, AB3BZ, Coordinator

SKYWARN

Introduction

The purpose of Anne Arundel County Skywarn Subnet is to feed information on weather conditions to The National Weather Service Office in Sterling, VA. Skywarn observers provide “ground-truth” and supplement the data received from Doppler radar and other tools.

The main Skywarn net will be activated (Bluemont, VA, 2-meter repeater, 147.300+) when severe weather is in the Baltimore-Washington forecast area. The county subnet will be activated only when severe weather is occurring in, or is approaching, Anne Arundel County, so as not to unnecessarily tie up the local repeaters. The subnet will be activated at the request of The National Weather Service, the Northeast Maryland net manager, or by the county coordinator when severe weather is actually present.

The role of Skywarn is not to provide forecast products to other amateur operators or the general public. There are better channels of communication to provide that information.

Procedures

The Davidsonville 2-meter repeater (147.105+) of The Anne Arundel Radio Club has been designated as the primary repeater, with the north county machine, located near Glen Burnie, (147.075+) as the back-up.

When the net is activated, the net control operator will establish another station as an alternate net control. The net criteria will then be announced and check-ins will be logged. All operators will be accepted even if they are untrained and/or unregistered Skywarn observers. The National Weather Service values all observations. Observations are then recorded. The net will be handed off to the alternate net control while the primary reports to The National Weather Service. The alternate will take observations and then report, etc.

Reports to The National Weather Service Office in Sterling, VA, are made directly to the Bluemont repeater or by telephone.

Weather conditions should be monitored by net control using either TV or the internet. Once severe weather has moved out of the county, the subnet

will be closed. If a watch or warning is still in effect for the county, it will be announced that the net may come up again if conditions warrant.

If there is a concurrent ARES or RACES net, the Skywarn net control will check into that net to make a request for weather, as long as the net is not handling emergency/priority traffic at the time. This will be done as briefly as possible so as not to interfere with emergency net operations.

Observers should not proceed to locations where severe weather is occurring to collect data, nor should they be encouraged to do so.

Weather Reports


Observers should give their Skywarn ID (if assigned), and location (this includes city AND state, nearest town, road or intersection). Landmarks should not be used as a method of location. Major highways are acceptable. Observers should not check-in if they have nothing to report.

During the summer months, The National Weather Service is interested in the following weather phenomena:

- Tornadoes, funnel clouds or rotating wall clouds.
- Hail (size in terms of U.S. coins: e.g., dime size, quarter size, etc.)
- Wind gusts in excess of 50 m.p.h.
- Flooding of streams, creeks or rivers.
- Roads or streets that are made impassable due weather conditions
- Rainfall in excess of 1 inch/hour as measured in an approved rain gage
- Any damage caused by wind or lightning
- Downed trees, large branches or power lines

In the winter months, they include the above conditions and:

- Wind gusts in excess of 35 m.p.h.
- Snow accumulation in inches
- Any ice accumulation on trees, streets or power lines
- Sleet or freezing rain

Any licensed amateur radio operator, with a knowledge of general net operations and Skywarn, may volunteer for net control. Any licensed amateur may check into the net to give their weather reports. It is not necessary to be a trained Skywarn observer to check into the net. Please contact William Smith, AB3BZ (*bill.ab3bz@verizon.net*) if you would like to participate. 

The Technical Stories of the Frequencies (Part 2)

Submission by Hale Adams, N3NYC

25 CYCLES

At the same time that 60 cycles was selected as a new standard it was recognized that at some future time there would be a place for some much lower frequency, but it was not until two years later that this began to narrow down to any particular frequency. In 1892 the first Niagara electrification, after several years' consideration by eminent authorities, had centered on polyphase alternating current as the most desirable system. The engineers of the promoting company had also worked out what they considered the most suitable construction of machine. This involved 5000-h.p. units at 250 revolutions per minute. Prof. George Forbes, one of the engineers of the company, had furnished the electrical designs for a machine with an external rotating field and an internal stationary armature. His design used eight poles, thus giving 2000 alterations per minute, or $16 \frac{2}{3}$ cycles per second. Quite independently of this, the Westinghouse company, in 1892, had been working on the development of synchronous converters, using belted 550-volt d-c. generators with two-phase collector rings added. The tests on these machines had shown the practicability of such conversion and had even proved at this early date, that the converter copper losses were much lower than in the corresponding d-c. generators. Thus it is an interesting fact that the first evidence of this important principle was obtained from a shop test rather than by calculation. The writer, from an analysis of the tests, which were made under his immediate direction, concluded that the armature copper losses must be considerably lower than in the same machine used as a d-c. generator. He also brought the matter to the attention of Mr. R.D. Mershon, then with the Westinghouse company, and the problem was then worked out mathematically by him and the writer, in two quite different ways, but with similar results, showing that the converter did have actually very much reduced copper losses. As a result of this work of the Westinghouse company on the synchronous converter, it was decided that, to make such machines practicable, some suitable relatively low frequency was required. This appeared to be about 30 cycles. About this time the construction of the Niagara generators was taken up with the Westinghouse company to see whether it would construct these machines according to the designs submitted by the promoting company's engineers. These designs were gone over as carefully as the knowledge of such apparatus, at that time,

continued on page 12

Upcoming Public Service & Events

Mar 31-Apr 1 Greater Baltimore Hamboree and Computerfest

February 2007

Upcoming Contests

Mar 3-4 - ♦ International DX Contest (Phone)
 Jun 9-12 - ♦ June VHF QSO Party
 Jun 23-24 - ♦ Field Day
 Jul 14-15 - ♦ IARU HF World Championships

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3 VE Testing- Registration: 1:30 p.m. Testing begins: 2 p.m.
4	5	6	7 Business Meeting: 7:30 p.m.	8	9	10
11	12	13	14 Fundraising Committee Meeting: 7:30 p.m.	15	16	17 ♦ Internat'l DX Contest (CW) 0000 UTC Saturday- 2400 UTC Sunday
♦ School Club Roundup 1300 UTC Monday - 2400 UTC Friday						
18	19 Deadline- March 07 Issue of <i>The Modulator</i>	20	21 Program Meeting: 7:30 p.m.	22 Executive Board Meeting	23 END OF CW TESTING	24
25	26	27 Deadline- Feature Articles for Apr 07 Issue of <i>The Modulator</i>	28 Fundraising Committee Meeting (all hands welcome): 7:30 p.m.			Phases of the Moon 02/02 Full Moon 02/10 Last Quarter 02/17 New Moon 02/24 First Quarter

permitted, and many apparent defects and difficulties were pointed out. The Westinghouse company then proposed, as a substitute, a 16-pole, 250-rev. per min. machine (the speed being definitely fixed at 250 rev. per min.). This gave $33 \frac{1}{3}$ cycles or as near to the Westinghouse proposed 30 cycle system, as it was possible to get. Then many arguments were brought forward, pro and con, for the two machines and frequencies. Prof. Forbes' preference for $16 \frac{2}{3}$ cycles was based partly on the possibilities it presented for the construction and operation of commutator-type motors, just as with direct current circuits. The Westinghouse contention was that this frequency was too low for any kind of service except possibly commutator-type machines. Tests were made with incandescent lights and it was found that at $33 \frac{1}{3}$ cycles there was little or no winking of light, while at $16 \frac{2}{3}$ cycles, the winking was extremely bad. Tables were also made up, showing the limited number of speed combinations at $16 \frac{2}{3}$ cycles for induction motors, in case such should come into use. This showed how superior the $33 \frac{1}{3}$ cycles would be as regards such apparatus. It was also brought out that synchronous converters, when such became commercial, would be much better adapted for the higher frequency, as the choice of speeds would be much greater. From the present viewpoint the arguments appear to have been much in favor of the Westinghouse side of the case.

As a consequence of all this discussion the suggestion was advanced by some one, that a 12-pole, 250-revolution machine, (that is, 3000 alternations, or 25 cycles), might meet sufficiently the good qualities of both of the proposed frequencies and would thus be a good compromise. In consequence a 12-pole, 25-cycle machine was worked up by the Westinghouse company and eventually this frequency was adopted for the Niagara generators. Afterwards, while these generators were being constructed it was brought out pretty strongly that the great advantage of this frequency would be in connection with synchronous converter operation, but that it was also extremely well adapted for slow-speed engine-type generators, which were then coming into use. In consequence of the prominence given this frequency it was soon adopted as a standard low frequency, especially in those plants where synchronous converters were expected to form a prominent part of the system.

However, while 60 and 25 cycles came into use, as described above, it must be recognized that they had competitors. For instance, $66 \frac{2}{3}$ cycles (8000 alternations or one-half of 16,000) was used to a considerable extent by one of the manufacturing companies. Also 50 cycles came into use in certain

plants and, to a certain extent, is still retained, but has become the standard high frequency of Europe. Instead of 25 cycles, the Westinghouse company advocated 30 cycles for some of its plants, largely because with the 25 per cent higher speeds permissible with such frequencies, the capacities of induction motors could be correspondingly increased and also incandescent lighting was more satisfactory. However, it was soon recognized that the $66 \frac{2}{3}$ and 30 cycle variations from the two leading frequencies of 60 and 25 cycles were hardly worth while, and they were gradually dropped, except in plants already installed. A brief attempt was made at a somewhat later period to place 40 cycles upon the market as a substitute for both 25 and 60 cycles. This was done under the impression that 40 cycles would give a universal system for arc and incandescent lighting, transmission, induction motors, synchronous converters and about everything else. This frequency possessed many merits and it was thought, at one time, that it might win out, but apparently the other two frequencies were too well established, and the 40 cycle system eventually lost ground.

The problem of the frequencies finally narrowed down to the two standards, and these two were accepted because it was thought that they covered such entirely different fields of service that neither of them could ever expect to cover the whole. In other words, two standards were required to cover the whole range of service. It was recognized that 25 cycles would not take care of alternating-current arc lighting and that it was questionable for incandescent lighting in general. In other ways, such as suitability for engine-type construction, application to induction motors and synchronous converters and transmission of power to long distances, it met the needs of an ideal system, as then understood. Also, in parallel operation of engine-type alternators, which was one of the serious problems of those days, the 25-cycle machines were unquestionably superior to the 60-cycle ones, due to the lesser displacement of the e.m.f. waves with respect to each other with a given angular variation in the engine speeds. However, although the 25-cycle system presented so many advantages, it could not take care of the lighting business, and, therefore, could not entirely dominate the situation.

As regards 60 cycles, it was felt that this could handle the direct lighting situation in a very satisfactory manner and was possibly better suited for transformers than 25 cycles, although there were differences of opinion in this matter, especially when it came to the larger capacities. It was reasonably well adapted for induction motors in general, but not for very low speeds. In matters of

transmission and in the operation of synchronous converters it was thought to be vitally defective.

From the above consideration it would appear that the 25-cycle systems presented the stronger showing as a whole and, therefore, there was a decided tendency toward this frequency, except in those cases where lighting directly from the alternating-current system was considered of prime importance. In those systems, such as many of the Edison companies, where low-voltage three-wire direct current was used from synchronous converters, the tendency was almost solidly toward the 25-cycle system. In those days the central station, which had gotten itself committed to the 60-cycle system so deeply that it could not change, was looked upon with commiseration. Sixty-cycle plants were looked upon, to a certain extent, as a necessary evil. In fact, so strong was the tendency toward 25 cycles that in many cases 25-cycle plants were installed for industrial purposes, where 60 cycles would have been better. The 25-cycle synchronous converter development advanced by leaps and bounds and the machines were so good in their operation that it was believed that 60-cycle converters could never be really competitive with them.

On the other hand, in those large plants, which were so "unfortunate" as to have 60 cycles installed, many apparent makeshifts were adopted to meet the various service requirements. In arc lighting, incandescent lighting, transformers and motors there was no need for makeshifts. However, in conversion to direct current, one of the greatest difficulties appeared. There were many who advocated motor-generators for this purpose, largely because the 60-cycle converter was thought to be impracticable, in spite of the fact that the manufacturing companies were putting them on the market. The 60-cycle converter at that time bore a bad name. It is now recognized that many of the faults of the early 60-cycle synchronous converter operation were not in the converters themselves, but were, to a considerable extent, in the associated apparatus. Low-speed engine-type, 60-cycle generators were not always adapted for operation of synchronous converters. In fact, in numerous cases such generators would not operate in an entirely satisfactory manner in parallel with each other, and yet when it was attempted to operate synchronous converters from these same generators the unsatisfactory results were not blamed upon the generating system but upon defects of the converters themselves. Unfortunately, defects in the generating and transmission systems usually appeared in the converters as sparking and flashing, and such troubles naturally would be credited to defects in the construction of the converters

themselves. In fact, in those days, 60-cycle converters were expected to do things which now are considered as absurd. For instance, in one case in the writer's knowledge a 60-cycle synchronous converter was criticized as being a very badly designed piece of apparatus, due to serious flashing at times. Investigation developed that this converter was expected to operate on either one of two independent 60-cycle systems with no rigid frequency relation to each other. The converter in service was thrown from one system to the other indiscriminately, and sometimes it flashed in the transfer and sometimes it did not. The machine was considered to be "no good" because it would not always stand such switching.

At one time the writer stood almost alone in his belief that the 60-cycle synchronous converter presented commercial possibilities sufficient to make it a strong future contender with the 25-cycle machine, provided proper supply conditions were furnished and certain difficulties in the proportions of the converter itself were overcome. One basis for his contention was that in some of the 60-cycle plants, where the generator rotation was quite uniform, the converters were evidently much superior in their operation to other plants, using slow-speed engine-type generators with considerable periodic variations. In such plants the hunting tendency of the converters was very greatly reduced, with consequent improvement in sparking and general operation. It was early recognized that hunting was a very harmful condition, both in 60- and 25-cycle synchronous converters, but whereas it was a relatively rare condition in 25-cycle plants it was much more common with 60 cycles. However, the operating public was not particularly concerned whether the trouble was in the generating plant or in the converters themselves, as long as such trouble existed and was not overcome. Very early in the synchronous converter development, it was found that hunting would produce sparking or flashing at the commutators of the converters. However, even in those plants where there was no hunting apparent, there was difficulty at times due to flashing, especially with sudden change of load, which resulted in temporary increase in the d-c. voltage. This was a difficulty which was inherent in the converter itself and could not be blamed entirely upon the generating or transmitting conditions, for 25-cycle machines were practically free from this trouble under similar conditions of operation. Investigation developed the fact that this flashing trouble was due largely to unduly high value of the maximum volts between commutator bars. This difficulty was recognized long before it was overcome, simply because certain physical limitations in construction had to be removed. There were two ways in which the maximum volts per bar could be reduced, namely, by increasing the number of commutator bars per pole

and by decreasing the ratio of the maximum volts to the average volts per bar, that is, by increasing the ratio of the pole width to the pole pitch, but both of these involved structural limitations in the allowable peripheral speeds of the commutator and the armature core. Here is where a little elementary mathematics comes in. The peripheral speed of the commutator is directly proportional to the distance between adjacent neutral points on the commutator, and the frequency. Therefore, with a given frequency the distance between the adjacent neutral points is directly proportional to the peripheral speed. Thus, a commutator speed of 4500 ft. per min. which was then considered an upper limit, the distance between adjacent neutral points on a 60-cycle converter is only 7 1/2 in. (19 cm.) This distance is thus fixed mathematically and is independent of the number of poles or revolutions per minute, or anything else, except the peripheral speed and the frequency. With this distance of 7 1/2 in., (19 cm.), about the only choice in commutator bars per pole was 36, giving an average of 16 2/3 volts per bar on a 600-volt machine, and nearly 20 volts per bar with momentary increase of voltage to 700, which is not uncommon in railway service.

However, it is not this average voltage which fixes the flashing conditions, but it is the maximum voltage between bars, and this is dependent upon the average voltage and upon the ratio of the pole width to the pole pitch. Here is where one of the serious difficulties came in, As mentioned above the pole pitch is directly dependent upon the peripheral speed of the armature core and the frequency. Therefore, in a 60-cycle machine, if the peripheral speed is fixed, the pole pitch is at once fixed. For example, with an armature peripheral speed of 7200 ft. per min., which was considered high at that time, the pole pitch becomes 12 in. (30.48 cm.), regardless of any other considerations, and here was where a most serious difficulty was encountered. If a sufficiently wide neutral zone for commutation was allowed the interpolar space became so wide that there was not enough left for a good pole width. For instance, if the interpolar space was made 6 in. (15.24 cm.) wide, in order to give a sufficiently wide commutating zone to prevent sparking or flashing, due to fringing of the main field, then this left only 6 in. for the pole face. With this relatively narrow pole face the ratio of the maximum volts to the average volts was so high that with the 36 commutator bars per pole the machine was sensitive to arcing between commutator bars thus resulting in flashing. By widening the pole face this difficulty would be lessened or overcome but with the fixed pole pitch of 12 in. (30.48 cm.) the neutral zone would be so narrowed as to make the machine sensitive to sparking and flashing at the brushes. Thus, no matter which way we turned we encountered trouble. Obviously there were two directions

of improvement, namely, by increasing the number of commutator bars, thus reducing the average voltage, and by increasing the pole pitch, thus allowing relatively wider poles with a given interpolar space. These two conditions look simple and easy, but it took several years of experience to attain them. When we have reached apparent physical limitations in a given construction, especially when such limitations are based upon long experience, we have to feel our way quite slowly toward higher limitations. For instance, in the case of the 60-cycle converters we could not boldly jump our peripheral speeds 20 to 25 per cent higher and simply assume that everything was all right. We first had to build apparatus and try it out for a year or so. Troubles, due to peripheral speed, do not always become apparent at once, and thus time tests are necessary. Therefore, while the peripheral speeds of the 60-cycle synchronous converters were actually increased 20 to 25 per cent practically in one jump, yet it took two or three years of experimentation and endurance tests before the manufacturers felt sure enough to adopt the higher speeds on a broad commercial scale. Thus, while the change from the older, more sensitive type of 60-cycle converter to the later type occurred commercially within a comparatively short period yet the actual development covered a much longer period.

Let us see now what an increase of 25 per cent in the peripheral speeds actually meant. As regards the commutator, the number of bars could be increased 25 per cent, that is, from 36 to 45 per pole, which was comparable with ordinary d-c. generator practise. In the second place, an increase of 25 per cent in the peripheral speed of the armature core meant a 15-in. (38.1-cm.) pole pitch, where 12 in. (30.8 cm.) was used before. Assuming, as before, a 6-in. (15.24-cm.) interpolar space, then the pole face itself became 9 in. (22.8 cm.) in width instead of 6 in. (15.24 cm.) or an improvement of 50 per cent. In fact, this latter improvement was so great that some manufacturers did not consider it necessary to increase the number of commutator bars, although in the Westinghouse machines both steps were made.

The above improvements so modified the 60-cycle converter that it began to approach the 25-cycle machine in its general characteristics. It was still quite expensive compared with the 25-cycle, due to the large number of poles, and its efficiency was considerably lower than its 25-cycle competitor, on account of high iron and windage losses. However, due to the need for such a machine it was gradually making headway, in spite of handicaps in cost and efficiency.

end of Part II

For Sale

Yaesu FT-1000 for Sale, Complete 200 Watt Station, Includes Kenwood SP-940 Speaker and Filter, Yaesu MD-1 Pedestal Mike, Telegraph Key (Brass/English), Complete with Operator's Manual. Very Low operating time.
\$1600 or best offer.

National SW-3 Rcvr with 80/BS Meter Coil. Winding data for other frequencies. Collectors item 1930 vintage. Includes Regulated Power Supply, Excellent Condition and in working order. Complete with Manuals and Sundry Data.
\$425 or Best Offer.

1915 ERA Tuned Plate Tuned Grid Xmtr, 10 Watt CW, 80 and 40 Meter Coils. Includes Power Supply and Spare Tube. All in working condition. With Schematics and Sundry Data.
\$120 or best offer.

all items, call W3UWV: (410) 308-3558. Bruce Packham

4X150A Tubes (Total Qnty 25) \$10.00 each
Heathkit Sixer (circa 1958) 6-meter transceiver \$ 50.00
Contact Roger Leighton @ 603-744-6107.



VE Report - January 2007

A Laurel ARC Volunteer Examiner Coordinator (LARC VEC) affiliated testing session was held at the BARC Meeting and Training Facility in Owings Mills, MD, on Sunday, January 7. Eleven people took exams for either their initial ham license or to upgrade their license.

The examinees achieved the following:

Became new Technician Class licensee

Scott Rosenthal KB3OKH

Upgraded to General Class licensee

Gary Cobb KA3TMH

Charles Hayloe N3OQD

Todd Chase N3VMP

Overall, Eleven tests were passed out of seventeen administered:

Element 1 (5 WPM CW): 50%

Element 2 (Technician Written): 100%

Element 3 (General Written): 91%

Element 4 (Extra Written): 0%

Thanks to the Volunteer Examiners who made the session possible:

Hale Adams N3NYC, Bill Dobson N3WD, Don Friedmann W3QYL, Tom Hendricks KB3CVS, Russ Kaufman N3YI, Ed Kriston K3CAV, Doc Sanders W3FYA, Robin Schaefer AA3SB, Rusty Schaefer N3WKE, and Dian Zimmerman AA3OF.

Next testing session at the BARC facility is Saturday, February 3, 2007. Registration opens at 1:30 PM and testing starts at 2:00 PM. For more information about the exam session, please send email to *n3wke at arrl.net*.

73, Rusty N3WKE

VE Team Leader

Our VEC that processes for the FCC: <http://larcmdorg.doore.net/vec/>

The **MODULATOR**

The Baltimore Amateur Radio Club,
P.O. Box 120
Reisterstown, MD 21136-0120

The Baltimore Amateur Radio Club
Repeater System **W3FT**

Frequency	PL
146.07/146.67	107.2
222.64/224.24	107.2
444.625/449.625	107.2

simplex: 146.55

web: <http://www.baltarc.com>

NON-PROFIT ORG.
U.S. POSTAGE

PAID
BALTIMORE, MD
PERMIT NO. 5972