

# ZERO BEAT

9-83



HAMPDEN COUNTY RADIO ASSOCIATION, INC

SEPTEMBER, 1983

W1-QSL BUREAU

SPRINGFIELD, MASS

ARRL AFFILIATED, 35th YEAR

THE NEXT MEETING OF THE HAMPDEN COUNTY RADIO ASSOCIATION  
WILL BE ON FRIDAY SEPTEMBER 9, 1983 AT 7:30 PM.

THE GUEST SPEAKER WILL BE  
DICK GOODMAN, WB1HH

DICK WILL ENTERTAIN US WITH A POTPOURI OF ASSORTED TALES,  
INCLUDING, BUT NOT LIMITED TO:

- THE TOWER ISSUE (OR HOW TO MOBILIZE AND WIN!)
- THE PLANE CRASH ON MT. GREYLOCK
- DICK'S PLANS FOR THE SECTION

DICK IS A NEVER-DULL TALKER ON HAM RADIO AS YOU KNOW FROM THE  
NETS! COME AND MEET HIM AND ENJOY AN INTERESTING AND INFORMATIVE  
EVENING. COFFEE AND MUNCHIES AS ALWAYS!

START GETTING YOUR GOODIES READY FOR THE ANNUAL CLUB AUCTION!  
WE'LL NEED EVERYONE'S HELP TO MAKE IT A SUCCESS.



*"Quick As A Wink" Printing & Sales Co.*  
573 Union Street West Springfield, Ma. 01089

IN THIS ISSUE:

- FIELD DAY REPORT
- ANNUAL BANQUET REPORT
- NEW NOVICE EXAM
- 1983 VHF SS RESULTS
- AND MORE.....

IN THE NEXT ISSUE:

- HAMS IN SPACE!
- KNOW YOUR OSCILLOSCOPE!
- WORK OSCAR 10!

PLEASE SEND US YOUR ARTICLES, OPINIONS, WANT ADS, ETC.  
WE WANT TO BE THE BEST POSSIBLE CLUB NEWSLETTER, BUT CAN'T DO IT ALONE.

IT'S TIME TO RENEW YOUR MEMBERSHIP AGAIN! I'M SURE YOU'LL AGREE  
YOU GET YOUR MONEYS WORTH EVERY YEAR. SEE THE TREASURER AT THE  
SEPTEMBER MEETING OR MAIL IT TO HIS HOME: GREG STODDARD, 1500  
MAPLETON AVE, SUFFIELD, CT 06078 (Still \$8.50 per year)

## ANNUAL BANQUET-A REPORT

A small, but enthusiastic group gathered at the Feeding Hills church on June 3 for our annual club banquet. This is the way the HCRA has ended the season for many years, and is a cherished tradition. Many of our well known members were there-W1KK, W1QWJ, W1TM, W1JWV, W1NLE, and W1HHR. John Sullivan and his lovely wife Frances attended and Sulli gave a talk on the no-code license and other FCC happenings. New club officers for the 1983-1984 season were elected and are listed elsewhere in this Zero Beat. The winner of the "SPELL HAMPDEN COUNTY" contest was Mike Ludkiewicz, W1DGJ. Mike received a beautifully hand-inscribed award. Then the moment we'd been waiting for- the HCRA HAM-OF-THE-YEAR. And amidst much clapping, it was presented to:

\*\*\*\*\*  
\*\*\*\*\* WALZKT PAUL KRESS \*\*\*\*\*  
\*\*\*\*\*

Congratulations, Paul!

Raffle prizes were then given out, with many in attendance taking home a nice item. The year was closed out and a happy and a full-of-roast-beef group departed for home. A good time was had by all.

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### TIDBITS

K1KKGX is our newest novice, congratulations, Kim'....The FCC will be in Hartford in October for testing, get your paperwork into Boston early, marked "Taking the exam in Hartford"... The Atari Microcomputer Network meets on the air via six regional nets every week. Jack McKirgan II, WD8BNG, will give you the info if you write... Dick Kratovil, W1GUG, is a Silent Key at the age of 47... W1DNB painted a friend's house on the Cape, vacation and work all at the same time, Eh, Bob... Get your Want Ads and For Sale items into Zero Beat early in the month to make sure they make the next issue. They are free to members... Club member K1IJV writes the "YL News and Views" column for QST, received a letter in Italian from a YL reader. Who else would translate it for her but our own paisano, W1KK... HAVE YOU HEARD THE NEW OSCAR SATELLITE ON 145.8-146.0 YET????... In the DXCC listings, K1WVX has 203 confirmed and K1GDV has 132. FB!... What do you think of the new Novice class study exam guide and test? How about writing a computer program to automatically create an exam for use in testing? We'll send it into the League!... W1CQF bought a new home in the Acres. Rumors that he moved his ham gear in and then went back for the wife and kids have been denied... WALZKT took another course this summer in BASIC programing... W1JP, and W1ABF sailed all summer and loved it...

FOR SALE: HY-GAIN TH6DXX, 6 element Tri-band beam. New stainless steel hardware, partially assembled. Includes: tilt head, instructions, manual, 12 foot long- 2 inch diameter steel mast. Contact Mike, W1DGJ, at 583-6678



VHF SWEEPSTAKES RESULTS-JANUARY 1983

Guess What---NUMBER 1 IN THE COUNTRY!!

HAMPDEN COUNTY RADIO ASSOCIATION!! 280,576 POINTS!!!

The club once again took the first place in Medium class with a score slightly down from 1982. (282,094) KA1APR, Fred Stefanick was the top club scorer with 24,180 points. The WA1RWU group has an excellent set of pictures in the June QST, and number two score in the country of 117,990 points. W1VD took the top spot away from Frank with a new all time record of 128,616 points. The club top single op in Connecticut was K1WVX with 984 points.

This was the last year for the WA1RWU operation from atop October Mountain in Washington, Mass, according to Frank Potts. For three years in a row, '80, '81, and '82, WA1RWU has dominated the top nation-wide spot in the contest, just barely loosing out this year. A hearty WELL-DONE to everybody involved all those years, especially to our inspiration for this contest, FRANK POTTS!

1984's contest is fast approaching and will require re-doubled efforts if we expect to place first. Can we do it three years in a row? You bet!

MANY THANKS TO ALL THESE HAMS FOR THEIR SUPPORT:

K1WVX	KA1BXB	KA1APR	AC1T	WA1PLS
W1JP	K1BE	KA1BLV	WA1VCU	K1SF
WB1APD	WB1EQS	KA1CRG	WB1GLZ	W1UPH
WB1EHS	W1WLE	WB1CXC	WA1GXY	WA1UZX
WB1BPJ	W1CJK	N1PF	WB1FIP	K1MAL
N1SR	WB1DMF	KA1CRX	WA1POB	K1PKZ
N1CAS	WB1DLH	WB1EMB	K1YOU	WB1FSV
N1CDR	WA1VHU	WA1YYW	KF1R	WA1YYK
KA1AVM	KA1CTM	N1ACS	W1JWV	WB1DTZ
WA1UOL	KA1CAX	K1COW	KB1Y	K1GXU
KA1DNX	WB1DOF	WB1EDA	W1UWX	K1ZJH

WA1RWU---AK4L, K1FO, K1TOL, K1WHS, WA1ECR, WA1UQC, WB1CAC  
WB1ETS---N1AEH  
KA1BXB---K1GX, WB1FVS

We realize not everyone listed sent in their logs to the HCRA score, but we'd rather include you than leave you out by mistake. Also, we appreciate your getting on the air and boosting everybody's scores!

The club has received from the ARRL the first place gavel, which is entrusted to the care of Frank Potts.

## 19 FIELD DAY 83

A small crew journeyed to the Middlefield Fair grounds to participate in the 50th running of the ARRL Field Day! An Arctic wind made it cold, especially after two weeks of warm weather. The fair ground is about 1600 feet above sea level, and is a perfect radio location. There is nothing higher nearby and lots of trees and buildings to hang antennas.

WALZKT and WALCQF set up on 40 meters with Paul's Icom 740 and a wire antenna. They made 134 cw and 35 ssb contacts for 606 points, our top station. NIPF, WITM, KALGPX, AND KALHSP operated on 80 meters out of Al's very comfortable camping trailer. They made use of WlKK's loaner Triton, and a Kenwood owned by Al. On cw they made 85 contacts and 80 ssb contacts for a total of 510 contest points. K1BE, WALPUX, and KALGIP operated 20 meters ssb for 84 contacts and 168 points. WALCQF, WITM and N1FJ put the station on 20 cw for 66 contacts and 264 points. K1BE's 901DM gave up the ghost at midnight and N1PF's old 101E put the station back on the air. KALHSP used his Yaesu 101E to put us on 10 and 15 meters and Joe built a home-made beam to put that signal out. On 15 meters, 17 cw contacts were made and 39 ssb, for a total point score of 146. With WITM acting as net control for the WMN and taking all kinds of traffic, our score will be above 2000 points, which is average for us compared to past Field Days.

Supper Saturday night was our traditional beans and hot dogs, which was well received. Worked All States as our goal this year was almost achieved, with 47 worked, and missing Alaska, Wyoming, and Idaho! Closest we've gotten so far! The group shut down early on Sunday, as we have in past years. Most of the people had left by 1 pm.

What would you like to do for next year? Should we go to a different location? Set up the Band Captain system differently? Do something radical like try to win? Let us have your thoughts!

**FOR SALE-** From the estate of W1LRE, Wes, -Swan 750cw transceiver, 700 watts on SSB, with homebrew power supply and spare set of finals, \$350.00 or best offer. Johnson 6N2 transmitter and Hallicrafters SX-24 receiver. Make offer.

From the estate of W1VON, Griff: HT-37 transmitter, \$100.; SX-115 receiver, \$200. or best offer. D-104 mike with amp, \$20.; Hallicrafters SKYRIDER 5-10 receiver, best offer. National HRO receiver and power supply, best offer. contact W1ALL, GEORGE HUGHES at 569-5360

(Note that I'll be bringing quite a lot of stuff to the October auction-It might take all evening just to sell off W1VON's stuff!)

**FOR SALE:** YAESU FT 901DM, HF transceiver, 1.8-29.9 mhz in 9 band positions, plus WWV in 10th position. USB, LSB, CW, FSK, AM, and FM; DC input to PA is 180 watts, for cw/ssb. All others 80 watts. Digital/analog frequency readout, PLL; Built-in Curtis keyer, memory frequency control, 12v/12 volt built-in power supply, dual-filter variable IF bandwidth tuning, and on CW, built-in RC active filter. Many other extras like 20db RF attenuator, speech processor, etc, etc. Includes extra set of 6146's, mike, factory service manual. Price with SP-901P, (speaker/phone patch), \$675. Without SP-901P, \$625 contact K1BE, below....

**YAESU FT-221**, 2 meter transceiver, all-mode, LSB, USB, CW, FM, AM; Built-in VOX, cw sidetone, Janel pre-amp, 20 watts output, 600 khz, - for repeater operations, 12v/120 volt power supply built-in, VFO plus 4 xtals, includes YM-86 mike, manual. \$225 see K1BE below...

**YAESU FT-620B**, 6 meter transceiver, LSB, USB, AM, CW with pre-amp, 52.525 xtal, vfo, mike. \$225.00 see K1BE below...

**KENWOOD TR-7200A**, 2 meter FM transceiver, 144-148 mhz, 22 channels, all popular frequencies, 10 watts high, 1 watt low, plus some extras, with mike and manual \$175.00 Contact Jeff Duquette, K1BE, at Zero Beat address or 413-569-6739 evenings, 730-3253 days.



TNX-QST

THIS IS WHAT IS NOW USED TO CREATE NOVICE LICENSE TESTS!  
SAVE THIS FOR YOUR RECORDS.

PR BULLETIN 1035A  
July 1983

Federal Communications Commission  
Private Radio Bureau  
Washington, D.C. 20554

## QUESTIONS FOR THE ELEMENT 2 AMATEUR RADIO OPERATOR LICENSE EXAMINATION

The questions used by the examiner in an Element 2 written examination must be taken from the following list. Candidates should NOT TRY TO MEMORIZE THESE QUESTIONS! The examination is a test of the knowledge a person needs in order to operate an amateur radio station properly. It is not a test of a person's ability to answer questions by rote. See PR Bulletin 1035, Study Guide For The Amateur Radio Operator Examinations for more information.

Preceding each question is a designation. For example, 2A-1.1. The 2 stands for the element; the A stands for the subject; the first 1 stands for the topic; and the second 1 is the number of the question. This same question format is shown uniformly throughout this bulletin. The call sign following each question identifies the amateur radio operator who submitted the question.

The Element 2 written examination consists of 20 questions. A pass score requires correct answers to at least 15 of the 20 questions. Six or more incorrect answers must be scored as fail. A certain number of questions for each of the nine Study Guide general subjects must be used in each test.

The examiners may use their discretion as to the form of the examination. It may be a single-answer test, multiple choice or essay type. See Section 97.28.

### SUBELEMENT 2A - Rules and Regulations (7 questions)

One (1) question must be from the following:

- 2A-1.1 What is the Amateur Radio Service? (K1CE)
- 2A-2.1 Who is an amateur radio operator? (K1CE)
- 2A-3.1 What is an amateur radio station? (K1CE)
- 2A-4.1 What is amateur radiocommunications? (K1CE)
- 2A-5.1 What is that portion of an amateur radio license that conveys operator privileges called? (K1CE)
- 2A-6.1 What authority is derived from an amateur radio station license? (K1CE)
- 2A-7.1 What is a control operator? (K1CE)
- 2A-7.2 What is the term used in Part 97 of the FCC Rules to define the amateur radio operator designated by the licensee of an amateur radio station to also be responsible for the emissions from that station?
- 2A-8.1 What is third-party traffic? (K1CF)
- 2A-8.2 Who is a third-party in amateur radio communications? (K1CE)

One (1) question must be from the following:

- 2A-9.1 What are the Novice class operator transmitting frequency privileges in the 80 meter band? (K1CE)
- 2A-9.2 What are the Novice class operator transmitting frequency privileges in the 40 meter band? (K1CE)
- 2A-9.3 What are the Novice class operator transmitting frequency privileges in the 15 meter band?
- 2A-9.4 What are the Novice class operator transmitting frequency privileges in the 10 meter band?
- 2A-9.5 What, if any, transmitting frequency privileges are authorized to the Novice class operator beside those in the 80, 40, 15 and 10 meter bands?
- 2A-9.6 In what frequency bands is a Novice class operator authorized to be the control operator of an amateur radio station?
- 2A-9.7 What does the term frequency band mean?
- 2A-9.8 What does the term frequency privilege mean?
- 2A-9.9 In what frequency band is the Novice class operator transmitting frequency privileges 3700-3750 kHz?
- 2A-9.10 In what frequency band is the Novice class operator transmitting frequency privileges 7100-7150 kHz?

One (1) question must be from the following:

- 2A-10.1 What is the only emission authorized for use by Novice class operators? (K1CE)
- 2A-10.2 What does the term A1 emission mean?
- 2A-10.3 What is the symbol for a transmission of telegraphy by on-off keying?
- 2A-10.4 What does the term CW mean?
- 2A-10.5 What, if any, emission privileges are authorized to the Novice class beside A1?
- 2A-10.6 What is the only telegraphy code a Novice class operator may use?
- 2A-10.7 Which, if any, telegraphy codes may a Novice class operator use beside the International Morse code?
- 2A-10.8 What does the term emission mean?
- 2A-10.9 What is the term for a transmission from a radio station, as used in the FCC Rules?
- 2A-10.10 What does the term emission privileges mean?

One (1) question must be from the following:

- 2A-11.1 Under what circumstances, if any, may the control operator cause unidentified radiocommunications or signals to be transmitted from an amateur radio station? (K1CE)
- 2A-11.2 What is the meaning of the term unidentified radiocommunications or signals?
- 2A-11.3 What is the term for transmissions from an amateur radio station without the required station identification?
- 2A-12.1 Under what circumstances, if any, may the control operator of an amateur radio station willfully or maliciously interfere with or cause interference to a radiocommunication or signal? (K1CE)
- 2A-12.2 What is the meaning of the term maliciously interfere?
- 2A-12.3 What is the term for transmissions from an amateur radio station which are intended by the control operator to disrupt other communications in progress?
- 2A-13.1 Under what circumstances, if any, may the control operator cause false or deceptive signals or communications to be transmitted? (K1CE)
- 2A-13.2 What is the term for a transmission from an amateur radio station of the word MAYDAY when no actual emergency has occurred?
- 2A-14.1 Under what circumstances, if any, may an amateur radio station be used to transmit messages for hire?
- 2A-14.2 Under what circumstances, if any, may the control operator be paid to transmit messages from an amateur radio station?

One (1) question must be from the following:

- 2A-15.1 What is one of the five principles which express the fundamental purpose for which the Rules for the Amateur Radio Service are designed?
- 2A-20.1 Call signs of amateur radio stations licensed to Novice class operators are from which call sign group?
- 2A-20.2 What is the format of a group D call sign?
- 2A-20.3 What are the call sign prefixes for amateur radio stations licensed by the FCC?
- 2A-20.4 In what call sign district will your amateur radio station be located?
- 2A-21.1 With which amateur radio stations may an FCC-licensed amateur radio station communicate? (AJ21)
- 2A-21.2 With which non-amateur radio stations may an FCC-licensed amateur radio station communicate?
- 2A-21.3 Under what circumstances may an FCC-licensed amateur radio station communicate with another amateur radio station in a foreign country?
- 2A-21.4 Under what circumstances (other than RACES operation) may an FCC-licensed amateur radio station communicate with a non-amateur radio station?
- 2A-21.5 What is the term used in FCC Rules to describe transmitting signals to receiving apparatus while in beacon or radio control operation?

## (2A-22 Logging-eliminated by rule change)

One (1) question must be from the following:

- 2A-23.1 How often must an amateur radio station be identified? (AJ21)
- 2A-23.2 How do I identify my amateur radio station communications?
- 2A-23.3 Do the FCC Rules require an amateur radio station to identify at the beginning of a transmission? (AJ21)
- 2A-23.4 How often must an amateur radio station be identified?
- 2A-23.5 What is the FCC Rule for amateur radio station identification?
- 2A-23.6 What is the least number of times an amateur radio station must transmit its station identification during a 15 minute communication?
- 2A-23.7 What is the least number of times an amateur radio station must transmit its station identification during a 25 minute communication?
- 2A-23.8 What is the least number of times an amateur radio station must transmit its station identification during a 35 minute communication?
- 2A-23.9 What is the longest period of time during a communication that an amateur radio station does not need to transmit its station identification?
- 2A-23.10 What is the least number of times an amateur radio station must identify itself during a 5 minute communication?

One (1) question must be from the following:

- 2A-24.1 What amount of transmitter power may an amateur radio station use? (AJ21)
- 2A-24.2 What is the maximum transmitter power input permitted to be used at an amateur radio station transmitting on frequencies available to the Novice class operator?
- 2A-24.3 In what circuit stage in an amateur radio station transmitter is power input determined?
- 2A-24.4 Which individual circuit power inputs must be included in determining the total power input to the final amplifying radio frequency stage to the antenna?
- 2A-25.1 Should an amateur radio operator receive an Official Notice of Violation from the FCC, how promptly should he/she respond? (AJ21)
- 2A-25.2 Should an amateur radio operator receive an Official Notice of Violation from the FCC, to whom does he/she respond?
- 2A-25.3 Should an amateur radio operator receive an Official Notice of Violation from the FCC relating to some violation that may be due to the physical or electrical characteristic of the transmitting apparatus, what information must be included in the response?
- 2A-26.1 Whom does the FCC hold responsible for the proper operation of an amateur radio station? (AJ21)
- 2A-26.2 When must an amateur radio station have a control operator?
- 2A-26.3 Who may be the control operator of an amateur radio station?

## SUBELEMENT 2B - Operating Procedures (1 question)

One (1) question must be from the following:

- 2B-1.1 What does the S in the RST signal report mean? (W1SE)
- 2B-1.2 What does the R in the RST signal report mean? (W1SE)
- 2B-1.3 What does the T in the RST signal report mean? (W1SE)
- 2B-2.1 At what telegraphy speed should a CQ message be transmitted? (W1SE)
- 2B-3.1 What is the meaning of the term zero beat?
- 2B-3.2 Why should amateur radio stations in communication with each other zero beat? (W1SE)
- 2B-4.1 How can on-the-air transmitter tune-up be kept as short as possible?
- 2B-5.1 What is the difference between the telegraphy abbreviations CQ and QRZ?
- 2B-5.2 What is the difference between the telegraphy abbreviations K and SK?
- 2B-5.3 What is the meaning of the telegraphy abbreviations DE, R, AR, 73, QRS, QTH, QSL, QRM and QRN?

## SUBELEMENT 2C - Radio Wave Propagation (1 question)

One (1) question must be from the following:

- 2C-1.1 What type of propagation uses radio signals refracted back to earth by the ionosphere? (WB2TRN)
- 2C-1.2 What is the meaning of the term skip propagation?
- 2C-1.3 What is the area of weak signals between the ranges of ground waves and the first-hop called? (WB2TRK)
- 2C-1.4 What is the meaning of the term skip zone?
- 2C-1.5 What does the term skip mean?
- 2C-1.6 What type of radio wave propagation makes it possible for amateur radio station to communicate long distances?
- 2C-2.1 What type of propagation involves radio signals that travel along the ground? (WB2TRH)
- 2C-2.2 What is the meaning of the term ground wave propagation?
- 2C-2.3 When two amateur radio stations located a few miles apart are separated by a low hill blocking their line-of-sight path, daytime communications between them on 3.725 MHz is probably via what kind of propagation? (WB2TRN)
- 2C-2.4 When compared to skip propagation, what is the usual effective range of ground wave propagation? (WB2TRN)

## SUBELEMENT 2D - Amateur Radio Practice (3 questions)

One (1) question must be from the following:

- 2D-1.1 How can an amateur radio station be protected against being operated by unauthorized persons?
- 2D-2.1 Why should all antenna and rotor cables be grounded when an amateur radio station is not in use? (N1BKE)
- 2D-2.2 How can an antenna system be protected from damage due to a nearby lightning strike?
- 2D-2.3 How can amateur radio station equipment be protected from damage due to lightning striking the electrical wiring in the building? (N1BKE)
- 2D-3.1 For proper protection from lightning strikes, what pieces of equipment should be grounded in an amateur radio station? (N1BKE)
- 2D-3.2 What is a convenient indoor grounding point for an amateur radio station? (N1BKE)
- 2D-3.3 To protect against electrical shock hazards, the chassis of each equipment in an amateur radio station should be connected to what? (N1BKE)
- 2D-4.1 When working on an antenna mounted on a tower, a person doing the climbing should always wear what type of safety equipment? (W891HH)
- 2D-4.2 For safety purposes, how high should all portions of a horizontal wire antenna be located? (W891HH)
- 2D-4.3 What type of safety equipment should a person on the ground wear while assisting another person on an antenna tower? (K9CH)

One (1) question must be from the following:

- 2D-5.1 What is a likely indication that radio frequency interference to a receiver is caused by front-end overload? (W891HH)
- 2D-5.2 When radio frequency interference occurs to a receiver regardless of frequency, while an amateur radio station is transmitting, what is likely the problem?
- 2D-5.3 What type of filter should be installed on a television receiver's tuner input as the first step in preventing overload from an amateur radio station's signal? (W891HH)
- 2D-5.4 What is meant by receiver overload?
- 2D-6.1 What is meant by harmonic radiation?
- 2D-6.2 Why is harmonic radiation by an amateur radio station undesirable? (W891HH)
- 2D-6.3 A multi-band antenna connected to an improperly tuned transmitter may radiate what type of interference? (W891HH)
- 2D-6.4 What is the purpose of properly shielding a transmitter?
- 2D-6.5 When interference is observed on only one or two channels of a TV receiver while an amateur radio station is transmitting, what is the likely problem?
- 2D-6.6 What type of filter should be installed on an amateur radio transmitter as the first step in reducing harmonic radiation?

One (1) question must be from the following:

- 2D-7.1 Why is it important to have the impedance of a transmitter final-amplifier circuit match the impedance of the antenna or feedline?
- 2D-7.2 What is the term for the measurement of the impedance match between a transmitter final-amplifier circuit and the antenna or feedline?
- 2D-7.3 What station accessory is used to measure RF power being reflected back down the feedline from the transmitter to the antenna? (WB9IHH)
- 2D-7.4 What station accessory is often used to measure voltage standing wave ratio?
- 2D-7.5 Where should a SWR bridge be connected to indicate the impedance match of a transmitter and an antenna?
- 2D-7.6 Coaxial feedlines are designed to be operated with what kind of standing wave ratio? (KFLY)
- 2D-7.7 If the SWR bridge reading is higher at 3700 kHz than at 3750 kHz, what does this indicate about the antenna?
- 2D-7.8 If the SWR bridge reading is lower at 3700 kHz than at 3750 kHz, what does this indicate about the antenna?
- 2D-8.1 What kind of SWR meter reading may indicate poor electrical contact between parts of an antenna system? (KFLY)
- 2D-8.2 High SWR readings measured from a half-wave dipole antenna being fed by coaxial cable can be lowered by doing what to the antenna? (KFLY)

#### SUBELEMENT 2E - Electrical Principles (3 questions)

One (1) question must be from the following:

- 2E-1.1 Electrons will flow in a copper wire when its two ends are connected to the poles of what kind of source? (KFLY)
- 2E-1.2 The pressure in a water pipe is comparable to what force in an electrical circuit? (K9CH)
- 2E-2.1 What are the two polarities of a voltage? (KFLY)
- 2E-2.2 What type of current changes direction over and over again in a cyclical manner? (KFLY)
- 2E-2.3 What is a type of electrical current called that does not periodically reverse direction?
- 2E-3.1 List at least four good electrical insulating materials. (K9CH)
- 2E-3.2 List at least three good electrical conductors. (K9CH)
- 2E-3.3 What is the term for the lowest voltage which will cause a current in an insulator? (K9CH)
- 2E-4.1 What is the term for a failure in an electrical circuit that causes excessively high current? (K9CH)
- 2E-4.2 What is the term for an electrical circuit in which there can be no current flow? (K9CH)

One (1) question must be from the following:

- 2E-5.1 When a voltage is applied to a circuit causing an electrical current to flow, what is consumed? (K9CH)
- 2E-6.1 What is the approximate length, in meters, of a radio wave having a frequency of 3.725 MHz? (KFLY)
- 2E-6.2 What is the relationship between frequency and wavelength? (K9CH)
- 2E-6.3 What is the approximate length, in meters, of a radio wave having a frequency of 21.120 MHz? (K9CH)
- 2E-7.1 Which are higher: radio frequencies or audio frequencies? (K9CH)
- 2E-7.2 Is 3,500,000 Hertz a radio frequency or an audio frequency? (K9CH)
- 2E-7.3 Radio frequencies are considered to be those above what frequency? (K9CH)
- 2E-8.1 Are audio frequencies higher or lower than radio frequencies? (K9CH)
- 2E-8.2 Audio frequencies are considered to be those below what frequency? (K9CH)
- 2E-8.3 What frequency range is 2500 Hertz: audio or radio? (K9CH)

One (1) question must be from the following:

- 2E-9.1 What is the unit of electromotive force? (K9CH)
- 2E-10.1 What is the unit of electrical current? (K9CH)
- 2E-11.1 What is the unit of electrical power? (K9CH)
- 2E-12.1 What is Hertz the unit measurement of? (K9CH)
- 2E-12.2 What is another popular term for Hertz? (K9CH)
- 2E-13.1 A frequency of 40,000 Hertz is equal to how many kilohertz? (K9CH)
- 2E-13.2 A current of 20 millionths of an ampere is equal to how many microamperes? (WB2TRN)
- 2E-13.3 A current of 2000 milliamperes is equivalent to how many amperes? (WB2TRN)
- 2E-13.4 What do the prefixes mega and centi mean?
- 2E-13.5 What do the prefixes micro and pico mean?

#### SUBELEMENT 2F - Circuit Components (1 question)

One (1) question must be from the following:

- 2F-1.1 What is the general relationship between the thickness of a quartz crystal and its fundamental operating frequency? (K9CH)
- 2F-1.2 What is the schematic symbol for a quartz crystal? (WA4CMS)
- 2F-1.3 What chief advantage does a crystal controlled transmitter have over one controlled by a variable frequency oscillator? (WA4CMS)
- 2F-2.1 What two internal components of a D'Arsonval meter interact to cause the indicating needle to move when current flows through the meter? (WA4CMS)
- 2F-2.2 What does a voltmeter measure?
- 2F-3.1 Draw the schematic diagram of a triode vacuum tube and label the elements. (WA4CMS)
- 2F-3.2 Draw the schematic symbol for a tetrode vacuum tube and label the elements. (WA4CMS)
- 2F-3.3 What was one of the earliest uses of a two-element vacuum tube? (WA4CMS)
- 2F-4.1 What device should be included in electronic equipment to protect it from damage resulting from a short circuit? (WA4CMS)
- 2F-4.2 When an excessive amount of current flows through a fuse, what happens to the fuse? The circuit? The current? (WA4CMS)

#### SUBELEMENT 2G - Practical Circuits (1 question)

One (1) question must be from the following:

- 2G-1.1 Draw a block diagram for a simple crystal controlled transmitter.
- 2G-1.2 Draw a block diagram for a simple transmitter having a variable frequency oscillator.
- 2G-2.1 Draw a block diagram for a simple superhetrodyne receiver capable of receiving A1 telegraphy radio signals.
- 2G-3.1 Draw a block diagram for a portion of an amateur radio station including a transmitter, an antenna feedline, an antenna and a SWR bridge.
- 2G-3.2 Draw a block diagram for a portion of an amateur radio station including a transmitter, a receiver, a TR switch, an antenna feedline and an antenna.
- 2G-3.3 Draw a block diagram for a portion of an amateur radio station including a transmitter, an antenna tuner, an antenna feedline and an antenna.
- 2G-3.4 Draw a block diagram for a portion of an amateur radio station including a transmitter, telegraphy key, antenna feedline and antenna.
- 2G-3.5 Draw a block diagram for a portion of an amateur radio station showing how two different antennas and a dummy antenna can be switched to the same transmitter.
- 2G-3.6 Draw a block diagram for a portion of an amateur radio station including a transmitter, a SWR meter, an antenna tuner, an antenna feedline and an antenna.
- 2G-3.7 Draw a block diagram for a typical Novice station including a transmitter, a receiver, an antenna feedline, an antenna, a T-R switch, grounding provisions and a telegraph key (WA4CMS)

SUBELEMENT 2H - Signals and Emissions (1 question)

One (1) question must be from the following:

- 2H-1.1 An interrupted carrier wave is considered to be which type of emission? (KF1V)
- 2H-2.1 What does the term backwave mean?
- 2H-2.2 What is a possible cause of backwave? (KF1V)
- 2H-3.1 What does the term key clicks mean?
- 2H-3.2 How can key clicks be eliminated?
- 2H-4.1 What does the term chirp mean?
- 2H-4.2 What can be done to a telegraph transmitter's power supply to avoid chirp? (KF1V)
- 2H-5.1 What is a common cause of superimposed hum? (KF1V)
- 2H-6.1 A signal received on 28.160 MHz is the 4th harmonic of what fundamental frequency? (K9CH)
- 2H-7.1 Spurious emissions from a transmitter may be caused by what problem in the power amplifier stage? (K9CH)

SUBELEMENT 2I - Antennas and Feedlines (2 questions)

One (1) question must be from the following:

- 2I-1.1 What is the approximate total length in feet of a half-wave dipole antenna cut for 3725 kHz? (K9CH)
- 2I-1.2 What is the approximate total length in feet of a half-wave dipole antenna cut for 7125 kHz? (K9CH)
- 2I-1.3 What is the approximate total length in feet of a half-wave dipole antenna cut for 21,125 kHz? (K9CH)
- 2I-1.4 What is the approximate total length in feet of a half-wave dipole antenna cut for 28,150 kHz? (K9CH)
- 2I-1.5 How is the approximate total length in feet of a half-wave dipole antenna calculated? (K9CH)
- 2I-2.1 What is the approximate total length in feet of a quarter-wave vertical antenna adjusted to resonate at 3725 kHz? (K9CH)
- 2I-2.2 What is the approximate total length in feet of a quarter-wave vertical antenna adjusted to resonate at 7125 kHz?
- 2I-2.3 What is the approximate total length in feet of a quarter-wave vertical antenna adjusted to resonate at 21,125 kHz?
- 2I-2.4 What is the approximate total length in feet of a quarter-wave vertical antenna adjusted to resonate at 28,250 kHz?
- 2I-2.5 When a vertical antenna is lengthened, what happens to its resonant frequency? (K9CH)

One (1) question must be from the following:

- 2I-3.1 What is a coaxial cable?
- 2I-3.2 What kind of antenna feedline is constructed of a center conductor encased in insulation, which is then covered by an outer conducting shield and weatherproof jacket? (K9CH)
- 2I-3.3 What are some advantages in using coaxial cable as an antenna feedline?
- 2I-3.4 What commonly-available antenna feedline can be buried directly in the ground for some distance without adverse effects? (K9CH)
- 2I-3.5 When an antenna feedline must be located near grounded metal objects, which commonly-available feedline should be used? (K9CH)
- 2I-4.1 What is parallel conductor feedline?
- 2I-4.2 Can an amateur radio station use TV antenna "twin lead" as a feedline? (K9CH)
- 2I-4.3 What are some advantages in using a parallel conductor feedline? (K9CH)
- 2I-4.4 What are some disadvantages in using a parallel conductor feedline? (K9CH)
- 2I-4.5 What kind of antenna feedline is constructed of two conductors maintained a uniform distance apart by insulated spreaders?

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